THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[Registered as a Newspaper.]

Vol. XXV. No. 614.] LONDON, FEBRUARY 16, 1875. [27th Year.] Price 6d.

RAMSAY'S NEWCASTLE CANNEL COAL. Analysis—10,000 cubic feet of gas per ton of coal; 26-candle gas; 13¼ cwt. coke per ton of coal.
The London Exhibition in 1851 was lighted with gas made from Ramsay's Cannel.
RAMSAY'S PATENT CONDENSED COKE.
DO. GARESFIELD COKE.

RAMSAY'S FIRE-CLAY ARTICLES.
GAS-RETORTS, introduced 1828. FIRE-BRICK WORKS, established 1804. FIRE-CLAY SANITARY PIPES, CHIMNEY-TOPS, and all Goods made of Fire-Clay. The Fire-Clay is worked from Blaydon Main Colliery, is of excellent quality, and no expense spared in perfecting every article. The FIRE-BRICKS (marked "RAMSAY") are to be seen in all parts of the world, and the Works are the most extensive in the Kingdom.
Manufactories—Derwenthaugh, Swalwell, and Hebburn Quay, near Newcastle-on-Tyne; and London Wharves—Falcon Wharf, No. 30, Bankside; and Honduras Wharf, Cubit Town. Large stocks kept.
Address G. H. Ramsay, Newcastle-on-Tyne.

GENUINE TORBAY PAINT
AND
SPECIAL GASOMETER PAINT
(Mixed ready for use).
FOUR PRIZE MEDALS.
WORKS: BRIXHAM, TORBAY.
These Paints are now used in 100 Country Gas-Works, and by all (but one) of the London Gas Companies, on Gasholders, Scrubbers, Purifiers, &c. They will cover tar effectually. Also used by the Admiralty, War Office, Railway Companies, Founders, &c.
They prevent and arrest rust, and protect iron from the action of water, sulphurous and gaseous exhalations.
The covering powers are considerably greater than those of any other Paint.—*See "Engineer," Nov. 2, 1866.*
London Office, 21, Great Winchester Street, E.C.

PROUD'S
SPECIALITIES IN WOOD GRIDS
FOR
PURIFIERS & SCRUBBERS
MADE FROM THE BEST QUALITY
OF
WELL-SEASONED PLANKS.
BROOKFIELD WORKS,
103, ICKNIELD STREET EAST,
BIRMINGHAM.

COWEN'S PATENT FIRE-CLAY RETORTS.
JOSEPH COWEN and CO.
BLAYDON BURN, BLAYDON-ON-TYNE,
Were the only parties to whom a Prize Medal was awarded at the Great Exhibition of 1851, for "Gas Retorts and other Objects in Fire-Clay," and they were also awarded at the International Exhibition of 1862 the Prize Medal for "Gas-Retorts, Fire-Bricks, &c. for Excellence of Quality."
J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts and Fire-Bricks in the Kingdom. Orders for Fire-Clay Retorts of all shapes and dimensions, and to fit any shaped Mouthpiece, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.
COWEN'S GARESFIELD COALS.
Coal Office,
Quay Side, Newcastle-on-Tyne.
Jos. Cowen & Co. are the only Manufacturers of Fire-Bricks and Clay Retorts at Blaydon Burn.

JOHN RUSSELL AND CO.,
THE OLD TUBE-WORKS, WEDNESBURY;
AND
THE ALMA WORKS, WALSALL,
Established at the commencement of Gas Lighting.
Warehouses:
69, UPPER THAMES STREET;
COMMERCIAL STREET, SPITALFIELDS;
5, CHARLES STREET, SOHO; and
16, SOHO SQUARE, } LONDON
35, 36, 37, & 39, GRANBY ROW, MANCHESTER.
J. R. and Co. are the original manufacturers of Wrought-Iron Gas Tubes and Fittings, and Inventors of the LAP-WELDED TUBES for Locomotive and Marine Boilers.
J. R. and Co. make all kinds of Tubes and Fittings for Gas, Steam, and Water; Gun-Metal Cocks, Stocks, and Dies; Galvanized Tubes and High-Pressure Tubes, &c.
Lists may be obtained on application to
69, UPPER THAMES STREET, LONDON.

JOHN BENT & SON,
BELL BARN ROAD, BIRMINGHAM,
MANUFACTURERS OF
WET AND DRY GAS-METERS,
OF
FIRST-CLASS MATERIALS & WORKMANSHIP;
Also, STATION-METERS, PRESSURE-GAUGES, STREET-LAMPS, REGULATORS, &c.
Established 1830.

THOMAS PIGGOTT & CO.,
SPRING HILL, BIRMINGHAM.
MANUFACTURERS OF
TELESCOPIC & SINGLE GASHOLDERS,
CAST & WROUGHT IRON TANKS FOR DITTO,
And Gas Apparatus of every Description.
Marine, Tubular, Cornish, Plain, Furnace, Saddle, and Range Boilers.
Sugar, Saltpetre, and all kinds of Pans.
Roofs, Girders, and Bridges, and General Smith's Work.
London Agent—W. G. DAVIS, 2, Brabant Court, Philpot Lane, E.C.

J. & H. ROBUS,
CONTRACTORS
FOR THE
ERECTION OF NEW & REMODELLING OF EXISTING GAS-WORKS.
RETORT-SETTING A SPÉCIALITÉ.
RETORTS SET, AND GUARANTEED TO BURN OFF A CERTAIN AMOUNT OF COAL, OR ELSE NO MONEY TAKEN FOR THE CONTRACT.
PLANS ON APPLICATION.
Retort-Setters sent to all parts of Europe and America.
Address, J. and H. ROBUS,
BELL GREEN, CATFORD, LONDON, S.E.

THE
DUKE OF HAMILTON'S
LESMAHAGOW
CANNEL COAL.
AGENT:
JAMES M'KELVIE,
HAYMARKET,
EDINBURGH.

GEORGE GLOVER & CO.,
PATENTEES OF THE
NATIONAL STANDARD GASOMETERS
For the English Government, and for the Government of the Netherlands;
MAKERS OF THE DUPLICATE COPY
Presented by Her Majesty's Government to the French Government;
AND MANUFACTURERS OF
IMPROVED
DRY GAS-METERS,
Warranted to Measure correctly, and not to vary.
RANELAGH WORKS, RANELAGH ROAD, PIMLICO, LONDON, S.W.;
236, GEORGE STREET, GLASGOW; and 15, MARKET STREET, MANCHESTER.

G. G. and Co. have just received the only Medal awarded for Gas-Meters at the Vienna International Exhibition.

SILVER MEDAL, PARIS EXHIBITION, 1867.

LLOYD AND LLOYD,

ALBION TUBE-WORKS, BIRMINGHAM,

MANUFACTURERS OF

WROUGHT-IRON TUBES AND FITTINGS

AND

LAP-WELDED IRON AND HOMOGENEOUS METAL BOILER TUBES.

Boiler-Tube Ferrules, Gun-Metal Gland Cocks, Water-Gauges, Whistles, &c.; Stocks, Taps, and Dies for Screwing, and Gas-Fitters Tools.

London Offices: No. 4, Cloak Lane, Queen Street, E.C.

WAREHOUSES:

LONDON: 157, UPPER THAMES STREET, E.C.

LIVERPOOL: No. 63, Paradise Street. | PARIS: No. 38, Rue du Chateau d'Eau.

MANCHESTER: Barlow's Croft, Chapel Street, Salford. | LILLE: No. 38, Rue Grande Chaussee.

LAMBERT BROTHERS, WALSALL.

ALPHA TUBE & FITTING WORKS

HENRY HOWARD & CO.,

COOMBS WOOD PATENT TUBE-WORKS,

OLD HILL, near DUDLEY,

MANUFACTURERS OF

HOWARD'S PATENT IMPROVED WROUGHT-IRON TUBES,

FOR GAS, STEAM, AND WATER;

Also ORDINARY WELDED WROUGHT-IRON TUBES and FITTINGS,

FOR GAS, STEAM, & WATER, EITHER BLACK, GALVANIZED, OR ENAMELLED.

CORE BARS FOR IRONFOUNDERS, STOCKS, TAPS, AND DIES, IRON COCKS, &c.

VICKARYS AND ROBERTSON,

Late JOHN VICKARY,

ESTABLISHED 1840,

CAS ENGINEERS, CONTRACTORS, IRON AND BRASS FOUNDERS,

WEST OF ENGLAND ENGINEERING WORKS, EXETER.

GASHOLDERS AND TANKS,

Retorts, Retort-Fittings, Condensers, Scrubbers, Purifiers, Station-Meters, Governors, Rack and Screw Valves. Gas and Water Mains always in Stock.

STEAM-ENGINES, EXHAUSTERS, SHAFTING AND GEARING, &c.

GAS-FITTINGS,

Including Chandeliers, Pendants, Hall Lamps, Brackets, Star and Sun Lights of all designs.

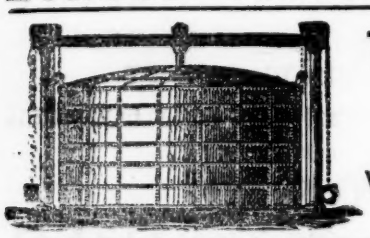
WET & DRY GAS-METERS,

Combining most recent improvements in principle and manufacture; upwards of 200,000 already in work, giving highest satisfaction. (A guarantee of five years given with every Meter.)

PLUMBERS WORK, including Lift and Force Pumps; Cocks for Gas and Water and Steam; Brass Fittings.

HYDRAULIC AND GENERAL ENGINEERING

LONDON OFFICE: 8, JOHN STREET, ADELPHI, W.C.



W. C. HOLMES & CO.,

WHITESTONE IRON-WORKS, HUDDERSFIELD

MANUFACTURERS OF

RETORTS, ANNULAR AND PIPE CONDENSERS,

WROUGHT AND CAST IRON SCRUBBERS, PURIFIERS,

GASHOLDERS,

GOVERNORS, AND ALL THE NECESSARY FITTINGS FOR COMPLETING THE ERECTION OF GAS-WORKS.

STATION & CONSUMERS WET OR DRY METERS, STREET & SERVICE MAINS, LAMP COLUMNS & BRACKETS, & WROUGHT-IRON TUBES AND FITTINGS; WROUGHT-IRON ROOFS FOR ANY SIZE OF BUILDINGS.

Sole Makers of B. W. Thurston's Combined Condensing, Scrubbing, and Washing Apparatus,

AND PATENTEES OF THE IMPROVED COMBINED CONDENSING AND PURIFYING APPARATUS SO EMINENTLY ADAPTED FOR EXPORTATION.

REFERENCES TO UPWARDS OF 300 GAS-WORKS.

LONDON OFFICES: 92, CANNON STREET. A. KINDER, AGENT.

WHITEHOUSE AND COMPANY, LIMITED,

GLOBE TUBE-WORKS, WEDNESBURY; & VICTORIA TUBE-WORKS, GREAT BRIDGE, STAFFORDSHIRE,

MANUFACTURERS OF

PATENT WELDED WROUGHT-IRON TUBES,

FOR GAS, STEAM, AND WATER;

GAS-FITTERS TOOLS, STEAM COCKS, AND ALL KINDS OF JOINTS.

HYDRAULIC TUBES, CORE BARS, TELEGRAPH POSTS, COILS, &c.

London Agent—ALFRED LAKEMAN, 9, FENCHURCH STREET, E.C.

JOSEPH AIRD,

WELLINGTON TUBE-WORKS, TIPTON, STAFFORDSHIRE,

MANUFACTURER OF

EVERY DESCRIPTION OF TUBING, GAS, STEAM, HYDRAULIC TUBES AND FITTINGS,
EITHER BLACK, GALVANIZED, OR ENAMELLED HOT WATER TUBES AND FITTINGS,
CORE BARS, COILS, COCKS (IRON OR BRASS),
CHANDELIERS, &c., GAS-FITTERS' TOOLS, GAS TONGS, STOCKS, TAPS, DIES, &c., &c.,
HANDRAIL TUBINGS, IRON AND BRASS, PLAIN OR TWISTED,
TELEGRAPH TUBES OR POLES, &c., &c.

EDWARD E. CROMBIE & CO.,

(Successors to N. DEFRIES & CO.,)

DIANA PLACE, EUSTON ROAD, LONDON,

MANUFACTURERS OF

PATENT DRY TWO AND THREE DIAPHRAGM GAS-METERS,

UPHELD FOR FIVE YEARS FREE OF CHARGE.

PRIZE MEDALS—LONDON, 1851, AND PARIS, 1867.

FLETCHER AND MURPHY,

GARRATT STREET WORKS, OLDHAM ROAD, MANCHESTER;

Manufacturers of

IMPROVED CONSUMERS WET GAS-METERS

IN CAST-IRON CASES,

THE UNVARYING WATER-LINE GAS-METER,

AND

IMPROVED DRY GAS-METERS;

STATION-METERS OF ALL SIZES, with PLANED JOINTS;

GOVERNORS, PRESSURE AND EXHAUST REGISTERS, TEST HOLDERS.

And all kinds of Experimental Gas Apparatus.

CAFFALL, THOMAS, & CO., LIMITED.

PATENT IMPROVED SEAL

FOR

GAS HYDRAULIC MAINS.

SAVES COAL, RETORTS, FUEL, LABOUR, TIME, SPACE, AND CAPITAL.

PREVENTS STOPPAGE OF ASCENSION-PIPES, DEPOSITION OF CARBON IN RETORTS, THICKENING OF TAR IN HYDRAULIC MAIN.

GIVES MORE GAS PER TON OF COAL, WITH HIGHER ILLUMINATING POWER, SATISFACTION, AND PROFIT TO SHAREHOLDERS AND MANAGERS.

IS STRONG, SIMPLE, EASILY FIXED AND WORKED, AND THOROUGHLY EFFICIENT AT ALL TIMES.

TESTIMONIAL.

Gas-Works, Guildford, Sept. 15, 1874.

GENTLEMEN,—The five retorts fitted with your Patent Moveable Seal for Dip-Pipes, on June 30, have been in constant use since that date, and have worked in a most satisfactory manner.

These Retorts are still quite clean and free from carbon, whilst others not so fitted, after being at work eight weeks, required scurfing, having a deposit of carbon 2 inches in thickness on the inside.

I also find a slight increase in the yield of gas per ton of coal carbonized, although your Patent Seals are fitted to but one-fifth of the Retorts now at work.

As your statements respecting your apparatus are fully confirmed by the results obtained in practical working, I should wish you at once to fix one to each of the ovens at these works, that I may obtain all possible advantage during the coming winter.

Yours truly,

Messrs. Caffall, Thomas, and Co., Limited, 28, Gracechurch Street, E.C. JOS. SHAW, Manager.

MODELS MAY BE SEEN, AND INFORMATION OBTAINED, AT THE OFFICES, 28, GRACECHURCH STREET.

WILLEY AND FORD,

GAS ENGINEERS,

WORKS: COMMERCIAL ROAD, EXETER,

INVITE THE ATTENTION OF GAS COMPANIES AND OTHERS FOR THE SUPPLY OF

EVERY DESCRIPTION OF GAS APPARATUS.

ENGINEERING DEPARTMENT.

NEW GAS-WORKS erected complete. Plans and Estimates furnished. MAINS, METERS, SERVICES, LAMPS, &c., adapted for Towns of any size. Gas Companies advised on Improvements, Extensions, and Alterations of Works.

GASHOLDERS AND TANKS.

RETORTS and RETORT-HOUSE FITTINGS, CONDENSERS, SCRUBBERS, ENGINES and EXHAUSTERS, PURIFIERS, STATION-METERS, GOVERNORS, VALVES, &c.

METER DEPARTMENT.

They beg special attention to the excellence and superiority of their WET and DRY METERS, several thousand being now in use by many of the largest Gas Companies in the West of England and South Wales. Warranted to measure correctly, and not to vary. Their acknowledged superiority has brought them into general use more rapidly than any Meters hitherto manufactured. A guarantee of Five years tendered with each Meter.

GAS-FITTING DEPARTMENT.

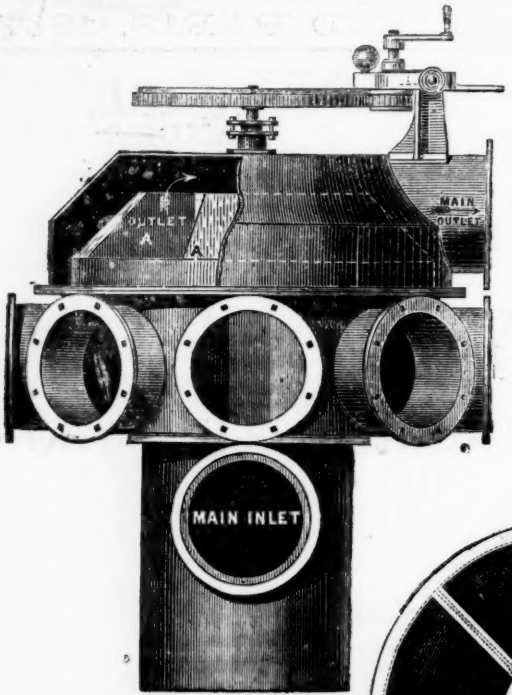
An extensive variety of Choice Designs in CHANDELIERS, PENDANTS, BRACKETS, STAR and SUN LIGHTS, MEDIÆVAL FITTINGS for CHURCHES, &c.

PATTERN-BOOKS and PRICE LISTS furnished.

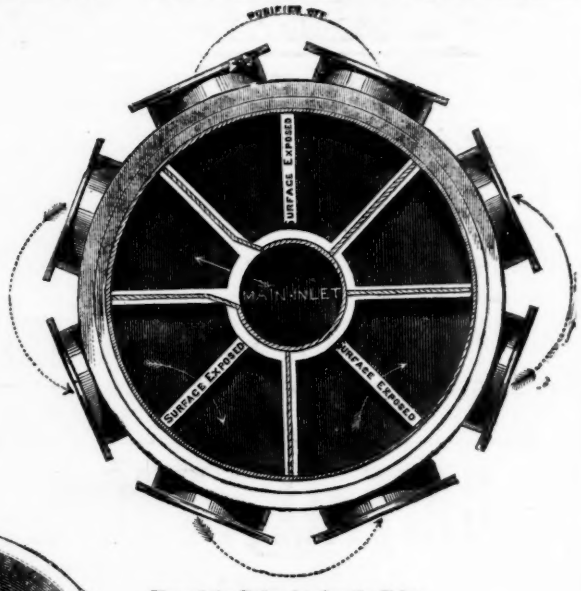
☞ PLEASE NOTE THE ADDRESS–

GAS ENGINEERING WORKS, COMMERCIAL ROAD, EXETER.

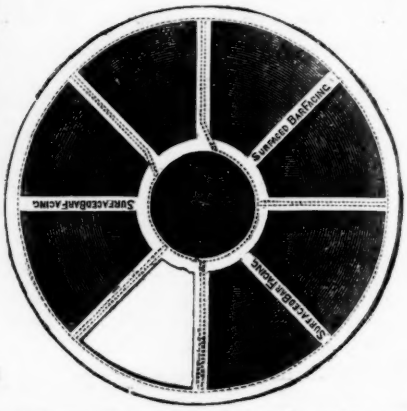
C. & W. WALKERS' PATENT CENTRE-VALVES.



Elevation of the Centre-Valve for four Purifiers. The safety cover is shown broken, to enable the Valve itself, which is inside, to be seen.



Plan of the Body, showing the Valve lying in it, with three of the facings, which were formerly exposed to settlements of dirt, carbon, naphthaline, &c., but which are now always covered by the surfaced bar-facings of the Valve. (See below.)



Plan of the Valve, or upper portion, showing the surfaced bar-facings referred to above.

These PATENT CENTRE-VALVES are the most perfect and certain means for working Purifiers. The Valve itself is protected from all injury inside the safety cover. The working of the Valve is so easy, and so governed by the stop-catch movement, that the Purifiers can be instantaneously changed in the dark as well as in daylight. They are scraped perfectly true, metal to metal, the facings heretofore exposed are always covered, and there is nothing more reliable, certain, and durable in a gas-works. By their use the floor of the Purifying-house is clear and level; the Valve and all connexions being beneath the floor, out of the way of working. A very considerable improvement and saving is effected in the cost of the connecting-pipes.

FOUR-WAY CENTRE-VALVES FORMING INLET, OUTLET, AND BYE-PASS.

MIDLAND IRON-WORKS, DONNINGTON, near NEWPORT, SHROPSHIRE; 8, FINSBURY CIRCUS, LONDON.

THE THAMES BANK IRON COMPANY,

(Successors to LYNCH WHITE,)

SUPPLY FROM STOCK

CAST-IRON RETORTS, SOCKET-PIPES for GAS or WATER PURPOSES, FLANGE-PIPES for STEAM, RAIN-WATER PIPES and GUTTERS, HOT-WATER PIPES and BOILERS, and all requisite Connexions for same; also LAMP-COLUMNS, LAMPS, WROUGHT FRAMES, WROUGHT-IRON TUBING, &c., &c.

All kinds of Gas-Works Apparatus and General Castings made to Pattern or Drawing.

ADDRESS—

OLD BARGE WHARF, UPPER GROUND STREET, LONDON, S.E.

OXIDE OF IRON.—

We are prepared to supply, on moderate terms,

HYDRATED PEROXIDE OF IRON (BOG OCHRE),

Same quality as supplied by us to several of the most extensive Gas Companies, and which has given entire satisfaction.

FRANCIS RITCHIE & SONS,

BELFAST.

E. GODDARD,

GAS-WORKS, IPSWICH,

SOLE AGENT FOR

EDGE'S PATENT

FOR REMOVING THE

CARBONACEOUS INCRUSTATION FROM GAS-RETORTS.

GAS PURIFICATION & CHEMICAL Co., LIMITED,

(Successors to JOHN WILLIAM O'NEILL & CO.,)

Offices—PALMERSTON BUILDINGS, OLD BROAD STREET, LONDON, E.C.,

CONTRACTORS FOR GAS PURIFICATION BY OXIDE OF IRON.

The superiority of the material supplied by this Company is generally recognized, and it is now in use in nearly all the London and most of the large Provincial Gas-Works.

JOHN WILLIAM O'NEILL,
SAMUEL H. JOHNSON, } Joint Managing Directors.

FRANCIS MORTON & CO., LIMITED, LIVERPOOL.

ESTABLISHED OVER A QUARTER OF A CENTURY.

ENGINEERS, GOVERNMENT CONTRACTORS, & MANUFACTURERS OF GALVANIZED CORRUGATED IRON ROOFS, BUILDINGS, AND SHEDDING,

For which Estimates will be given on application,

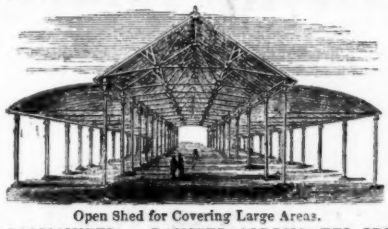
ERECTED COMPLETE IN THIS COUNTRY

OR

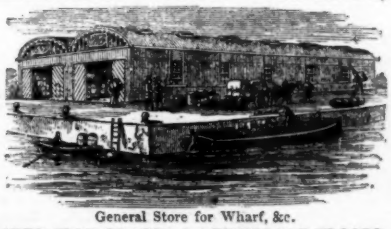
PREPARED TO PLAN FOR ERECTION ABROAD,

EITHER WITH

TIMBER FRAMING or WHOLLY in IRON.



Open Shed for Covering Large Areas.



General Store for Wharf, &c.

GALVANIZED or PAINTED CORRUGATED IRON ROOFING PLATES and TILES. HEAVY CORRUGATED IRON PLATES for FIREPROOF FLOORS, ROADWAYS, PARAPETS, &c. WROUGHT-IRON TANKS, GUTTERING, and CONSTRUCTIONAL WROUGHT IRONWORK.

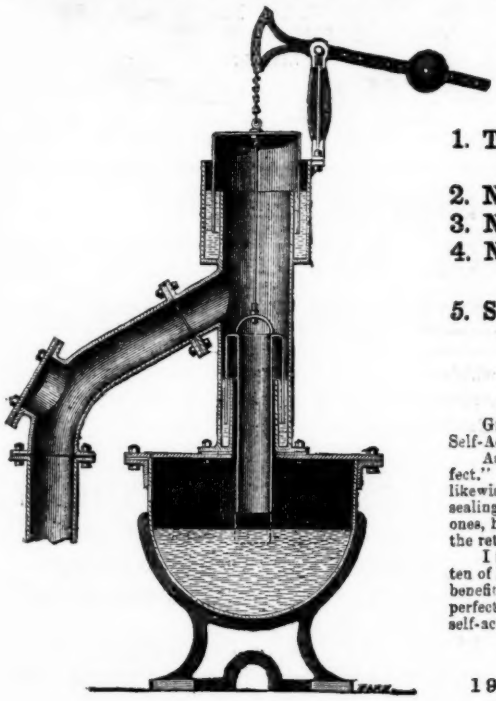
Designs prepared, and Illustrated Descriptive Catalogue forwarded on application.

LONDON OFFICE: 1, DELAHAY STREET (First door out of Great George Street), WESTMINSTER, S.W.

SELF-ACTING REMOVABLE DIP-PIPE,

PATENTED BY

CHANDLER & STEVENSON.



ADVANTAGES.

1. There is no pressure on the Retorts.
2. No deposit of Carbon.
3. No scurfing is required.
4. Never a choked Ascension-Pipe.
5. Saves Fuel and Wear and Tear.
6. Gets 10 per cent. more Gas out of the Coal, and a higher Illuminating Power.
7. Is never out of order.
8. Requires no attention.
9. Is perfectly automatic in its action.

TESTIMONIAL.

Metropolitan District Asylum, Caterham, Surrey, Dec. 14, 1874.

MESSRS. CHANDLER AND STEVENSON.

GENTLEMEN,—I have much pleasure in bearing testimony to the complete working of your "Patent Self-Acting Dip-Pipes," which have now been in constant operation over three months.

As regards the action of the apparatus, I can describe it no better than by calling it "simply perfect." Immediately the retort is charged and the lid secured, the small holder rises, which lifts the Dip; likewise the instant the gas is permitted to escape at the mouthpiece the holder falls, thus perfectly sealing the Dip. I am fully convinced of the superiority of these Self-Acting Dips over Non Self-Acting ones, having experienced the fact that stokers do occasionally neglect to unseal the Dip after charging the retort, thereby causing a waste or loss.

I feel that it is quite unnecessary for me to say more on the subject, excepting that, having had ten of Messrs. Chandler's Dip-Pipes in use more than one year, and having experienced the great benefits derived thereby, inasmuch as the yield of gas from the coal is greatly increased, and the retorts perfectly free from carbon and other advantages, and seeing that the same Dip has been made perfectly self-acting by the second patent, I feel convinced that this is the right thing.—Yours obediently,

W. CRICKMAY, Resident Engineer.

For terms of use and cost, apply to Mr. G. W. STEVENSON,

19, GREAT GEORGE STREET, WESTMINSTER.

THOMAS ALLAN & SONS, of Spring-bank Iron-Works, Glasgow, manufacture small cast-iron GAS AND WATER PIPES, 1½ to 6 inches, at their branch works, Stockton-on-Tees, and have at present a large stock, which they are open to sell at moderate prices.

BRONNER'S PATENT GAS-BURNERS give 99 per cent. of light, as compared with 27 per cent. given by ordinary burners, with equal consumption of gas.—*Vide* "Gas Referees Report," published June, 1869.
HENRY GREENE AND SON, Sole Consignees of Brönner's Patent Improvements in Gas Lighting, 16 and 17, King William Street, LONDON, E.C.

CATHELS'S Patent District Dry Gas-GOVERNOR is the only perfect self-acting contrivance for Regulating the Pressures in the higher levels of a district.
For prices, &c., apply to the Manufacturers, Messrs. GUEST AND CHRIMES, ROTHERHAM.

CATHELS & TERRACE'S Patent Four-WAY DISC GAS-VALVE is the simplest and best Valve for Purifiers, and as a By-pass for other apparatus in Gas-Works. It is always gas-tight, and has no springs, ground faces, or other delicate parts. By its use the flow of the gas cannot be accidentally stopped, and it never sticks.
For prices, &c., apply to the Manufacturers, Messrs. GUEST AND CHRIMES, Foundry and Brass Works, ROTHERHAM.

WATER-MAINS.
COTTERILL'S PATENT STEEL TUBE-DRILLS, for connecting services to water-mains, *under pressure*, without turning off the water. They drill and tap themselves, and are left in the mains. Made of all sizes, from ¾ to 2 inches and upwards. They cost less than the ordinary plan.
Apply to CHARLES FORSTER COTTERILL, Cannock, STAFFORD, Patentee.

BIRTLEY IRON WORKS,
CHESTER-LE-STREET,
DURHAM.
Manufactory for every description of Casting and Machinery for Gas-Works and Water-Works.
Warehouse in London for Cast-Iron Pipes and Connexions of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.
Agent in London, Mr. J. MANWARING, 101 Cannon Street E.C.

JAMES OAKES & CO.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
WENLOCK IRON WHARF, 20 & 22, WHARF ROAD
CITY ROAD, LONDON, N.,
Beg to inform Gas and Water Companies and the public, that they keep in stock in London all the CASTINGS in general use in Gas and Water Works, including Iron Retorts, Socket and Flange Pipes, Bends, Branches, and Syphons of all sizes, Lamp Columns, &c., &c.
N.B.—Orders for Cast-Iron Tanks, Girders, Columns, Cylinders, and all irregular castings, will have immediate attention. CHARLES HORSLEY, Agent.

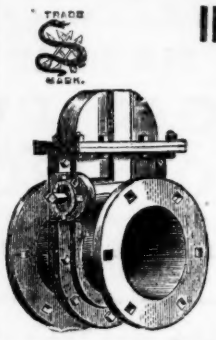
INTERNATIONAL EXHIBITION, 1862.
CLASS X.
PRIZE MEDAL
For excellence of Fire-Clay Gas Retorts, and
"HONOURABLE MENTION" for
good quality of Fire-Bricks.
WILLIAM STEPHENSON & SONS,
THROCKLEY,
NEWCASTLE-ON-TYNE.

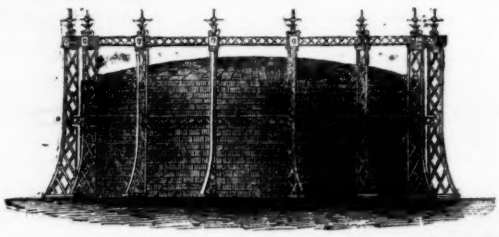
B. CARPENTER,
THE ORIGINAL MANUFACTURER OF
WOOD SIEVES
FOR
GAS PURIFIERS & SCRUBBERS.
WORKS:
22, HERMES STREET, PENTONVILLE ROAD,
LONDON, N.

LAMP-PILLARS,
GAS-LAMPS, FOUNTAINS.
Our new Illustrated Catalogue contains a choice and extensive selection of designs for these, and is forwarded to any part of the world on receipt of 12s. 6d., which is allowed on first £10 order.
W. T. ALLEN & CO.,
GAS & WATER ENGINEERS & CONTRACTORS,
201, UPPER THAMES STREET,
LONDON, E.C.

WALTER MABON & CO.,
Engineers,
ARDWICK IRON-WORKS,
FAIRFIELD STREET, MANCHESTER,
MANUFACTURERS OF
IRON TANKS, GASHOLDERS,
GAS APPARATUS,
PIPES, VALVES, IRON ROOFS,
WROUGHT AND CAST IRON GIRDERS.
DESIGNS, SPECIFICATIONS, & ESTIMATES FURNISHED.

ALFRED WILLIAMS,
PHŒNIX FIRE-BRICK WHARF,
64, BANKSIDE, SOUTHWARK, LONDON, S.E.
GAS ENGINEER AND CONTRACTOR FOR THE ERECTION OF GAS-WORKS,
AND FOR THE
SUPPLY OF RETORTS, FIRE-BRICKS, CAST-IRON MAINS,
AND ALL MATERIALS FOR GAS MANUFACTURE AND DISTRIBUTION.

B. DONKIN & CO.'S
IMPROVED GAS-VALVES

WITH WROUGHT-IRON PINIONS,
List of prices, with full dimensions of all sizes up to 48-inch, to be had on application.
These Valves are all proved on both sides to 30 lbs. on the square inch before leaving the works, and are always kept in stock.
VALVES MADE WITH OUTSIDE RACKS TO ORDER.
ALSO, SCREW WATER-VALVES WITH GUN-METAL FACES.
ALSO SOLE MAKERS OF
J. BEALE'S NEW PATENT GAS EXHAUSTERS.
B. DONKIN & CO.,
GENERAL ENGINEERS AND IRONFOUNDERS,
MAKERS OF STEAM-ENGINES,
BLUE ANCHOR ROAD, BERMONDSEY,
LONDON, S.E.


THE HORSELEY COMPANY,
LIMITED,
TIPTON, STAFFORDSHIRE.
LONDON OFFICE:
6, WESTMINSTER CHAMBERS, VICTORIA STREET,
GAS ENGINEERS, IRONFOUNDERS, &c.,
MANUFACTURERS OF
GASHOLDERS, WROUGHT AND CAST IRON TANKS, CONDENSERS, PURIFIERS, SCRUBBERS, MAINS, RETORT-LIDS, PLAIN AND DISHED, LAMP-POSTS, PIPES,
AND ALL REQUISITES FOR EITHER
GAS OR WATER WORKS;
ALSO
MAKERS OF ROOFS, BRIDGES, &c.

LIME SUPERSEDED
IN THE
PURIFICATION OF ILLUMINATING GAS
BY
SPENCE'S PATENT DRY COPPERAS.
The only purifying material which removes by one process, without injury to the purifiers, all Ammonia and Sulphuretted Hydrogen. It has been in use for upwards of five years at some of the largest Gas-Works in the Kingdom.
TESTIMONIALS SENT ON APPLICATION TO
SPENCE BROTHERS CHEMICAL COMPANY, LIMITED,
VICTORIA CHEMICAL WORKS, BRADFORD, MANCHESTER;
SOLE MANUFACTURERS OF SPENCE'S PATENT DRY COPPERAS,
SPENCE'S PATENT GAS DEODORIZER, AND MUDIE'S DISINFECTANT;
MANUFACTURERS OF
SULPHATE OF AMMONIA, VITRIOL, COPPERAS, &c.;
PURCHASERS OF SPENT OXIDE AND AMMONIACAL LIQUOR, AND
CONTRACTORS FOR THE PURIFICATION OF COAL GAS.

TANGYE BROTHERS AND HOLMAN,

LAURENCE POUNTNEY LANE,

LONDON.

SOLE MAKERS OF HUNT'S PATENT

EQUILIBRIUM GAS GOVERNOR.

In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communications being avoided by placing the Lever or Radius Arm (shown at C on the drawing) inside the Valve-Chamber upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.

The principal advantages of this arrangement over the ordinary form of Governor are as follows:—

Its sensitive action prevents oscillation.

It is self-adjusting—i.e., it maintains a steady pressure under variations of inlet pressure or a fluctuating consumption.

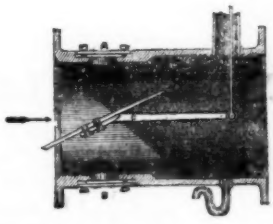
The inlet to Gasholder being contracted to the smallest possible dimensions, all danger from leakage through insufficiency of seal, tilting, &c., is entirely avoided.

The valve portion being separate from the holder, it can be handled and fixed like an ordinary Slide-Valve direct in the main; and the holder can be placed at any convenient distance immediately above it. The cost is thus materially reduced, and the inconvenience of heavy lifts done away with.

There are no working parts likely to get out of order.

These Governors have been adopted by several leading Gas Companies, among whom are the following:—

The Gaslight Company—two 36 in. at Blackfriars.
" " a 36 in. at Goswell Road.
" " a 24 in. at "
" " a 24 in. at Whitechapel.
" " an 18 in. at Bow Common.
" " a 24 in. at Beckton.
" " a 6 in. at "
The London Gas Company—a 24 in. at Nine Elms.
" " an 18 in. at "
" " an 8 in. at "
The Exeter Gas-Works—a 24 in.
The Abergavenny Gas-Works—a 10 in.
The Birmingham Gaslight Company—an 8 in.
The Monmouth Gas-Works—an 8 in.
The Devonport Gas-Works—an 8 in.
The Cannes Gas-Works (France)—an 8 in.
The Mentone Gas-Works (France)—an 8 in.
The Rochdale Gas-Works—a 4 in.
The Imperial Gas Company, a 12 in at Great Cambridge Street.



TANGYE'S HORIZONTAL HIGH-PRESSURE EXPANSIVE

STEAM-ENGINES.

OVER 1200 SOLD SINCE THEIR INTRODUCTION IN DECEMBER, 1869.

In designing this Engine the utmost regard has been paid to simplicity of arrangement, strength of construction, and economy in cost. The working parts are considerably reduced in number, as compared with Horizontal Engines generally, rendering it far more durable and compact, the bed-plate, front cylinder cover, guides, and plummer-block for crank-shaft bearing being all cast in one piece, which in design and proportions is admitted by competent engineers to be perfect, and to afford a strength and rigidity that cannot possibly be attained in the best fitted engines of the ordinary horizontal type. The extraordinary stiffness of this Engine will permit of its being driven at a much greater maximum speed than engines generally, and with far less wear and tear. The cylinder with its valve-chest is bolted to the end of the bed. The cross-head slippers and connecting-rod ends are made adjustable, so that any wear can be readily taken up. The fly-wheel, cylinder-end, connecting-rod, and crank-plate, are all bright. All the parts are made to Whitworth's Gauges, and the material and workmanship are of the highest class throughout.

The Governor is of a very special description, and combines in the small space usually occupied by the ordinary steam stop-valve, a governor, throttle-valve, and stop-valve complete. It is exceedingly sensitive, simple, and compact.

These Engines are adopted in Gas-Works at Haggerston (Independent Gas Company), Nine Elms (London Gas Company), Falmouth, Harrow, Jersey, Plymouth, Richmond, Rochdale, Santiago (Chili), &c.

VIENNA EXHIBITION, 1873.—The highest prize and only Medal "for Progress" for Direct-Acting Steam Pumps for general purposes was awarded to TANGYE BROTHERS AND HOLMAN, for

THE "SPECIAL" DIRECT-ACTING STEAM PUMPS.

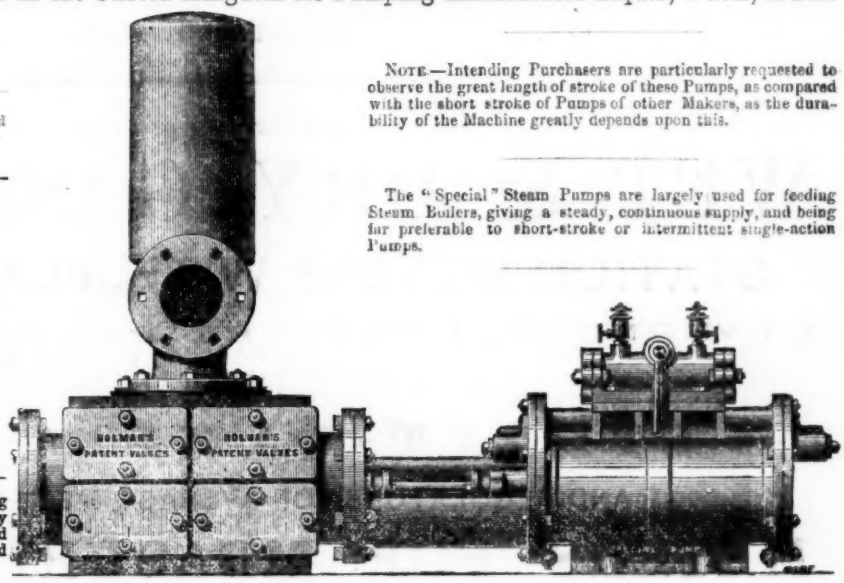
4000 have been sold since their introduction in 1867.

In use in over Eighty Gas-Works in the United Kingdom for Pumping Ammoniacal Liquor, Water, or Tar.

The following are a few of the leading Sizes:—

Diameter of Steam Cylinder.	Diameter of Water Cylinder.	Length of Stroke.	Gallons of Water per Hour, Approximate.	Reduced Prices.
3	1½	9	550	£16
4*	2	9	970	18
3	3	9	2,200	18
4*	3	12	2,200	20
6*	3	12	2,200	25
4	4	12	3,900	25
6*	4	12	3,900	30
6	5	12	6,100	35
7*	5	12	6,100	40
6	6	12	8,800	40
8*	6	12	8,800	50
7	7	12	11,900	50
10*	7	12	11,900	65
8	8	18	15,660	65
10	8	18	15,660	75
10	10	24	24,400	100

* These sizes being usually selected for pumping Tar and Liquor, are always in stock, or nearly ready, fitted with all pump details in iron, and extra length distance piece between steam and pump cylinder at a small extra cost.



NOTE.—Intending Purchasers are particularly requested to observe the great length of stroke of these Pumps, as compared with the short stroke of Pumps of other Makers, as the durability of the Machine greatly depends upon this.

The "Special" Steam Pumps are largely used for feeding Steam Boilers, giving a steady, continuous supply, and being far preferable to short-stroke or intermittent single-action Pumps.

London 1851. New York, 1853 Paris, 1855. London, 1862.

Dublin, 1865.

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

Paris, 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

LONDON, E.C.

THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS,

1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

WILLIAM PARKINSON & CO.,

(SUCCESSORS TO SAMUEL CROSLEY,)

COTTAGE LANE, CITY ROAD, LONDON, E.C.

Established 1816.

MANUFACTURERS OF PATENT

WET & DRY GAS-METERS,

STATION-METERS WITH PLANED JOINTS,

GOVERNORS, PRESSURE REGISTERS, GAUGES,

AND EXPERIMENTAL APPARATUS,

STREET-LAMP METERS,

AND REGULATORS FOR AVERAGE METER INDICATION.

METERS FOR MEASURING WATER.

CONTENTS.

Circular to Gas Companies:— PAGE
The Common Council of London on the Purchase Bill . . . 209
The Nottingham Town Council and the Gas-Works . . . 210
A Good Example at Tunbridge Wells . . . 210
Gas Affairs at Liverpool . . . 210
The Corporation of Norwich and the British Gas Company's Bill . . . 210
The Gas Supply in the Pottery Towns . . . 210
Proposed Purchase of Gas-Works at Heckmondwicke . . . 210
Professor Würtz's New Processes in Gas Analysis . . . 210
The York Gas Company . . . 210

Water and Sanitary Notes:—
Constant Supply in the East London District . . . 210
The Society of Arts on the Water Supply at Fires . . . 210
Proposed Sale of the Blackburn Water-Works . . . 211
Opposition to the Wakefield Water Bill . . . 211
The Town Council of Newcastle and the Proposed Purchase of the Water-Works . . . 211
Increase in the Debt of Local Authorities . . . 211
Letter of the Kent Water-Works Company to the Metropolitan Board . . . 211

Leading Articles:—
The Water Bills for 1875 . . . 211
A Treatise on the Science and Practice of the Manufacture and Distribution of Coal Gas . . . 212

Correspondence:—
Steam-Jet Exhausters and Scrubbers . . . 213
Brick Ovens . . . 214
Meter-Indexes . . . 214
Use and Value of Carbon . . . 214
Standard of Pressure . . . 214
Mr. Mann's Patent for Sulphur Purification . . . 214
Coating Gas-Mains . . . 214
Variations in the Registration of Dry Meters . . . 214

Parliamentary Intelligence:—
Gas and Water Bills, 1875 . . . 215
Progress of Bills in House of Lords . . . 215
Progress of Bills in House of Commons . . . 215

Legal Intelligence:—
Court of Chancery—
Eupion Gas Shares—Parkins *v.* Jelf-Sharp and Others . . . 216
In re the Steam Stoker Company, Limited . . . 216
Gloucestershire Quarter Sessions—Cheltenham Water-Works Company, *Appellants*, *v.* the Overseers of Cheltenham, Charlton Kings, Leckhampton, and Westbury, *Respondents* . . . 216
City of London Court—Higham *v.* The East London Water-Works Company . . . 217

Miscellaneous News:—
Greenwich Consumers Gaslight and Coke Company . . . 211
Birmingham Water Supply . . . 214
Gas Signal-Light at Westminster . . . 215
New Processes in Proximate Gas Analysis. By Henry Würtz, of New York . . . 217
Metropolis Gas Supply . . . 220
Metropolis Water Supply . . . 224
Meeting of the Commercial Gas Company . . . 224
Local Board Water-Works . . . 226
Liverpool Gas Supply . . . 226
Meeting of the York United Gas Company . . . 226
Meeting of the York New Water-Works Company . . . 227
Meeting of the Stockton and Middlesbrough Water-Works Company . . . 227
On the Composition and Physiological Properties of Coal Tar Products. By M. Dumas . . . 228
M. Martin's Process for the Production of Illuminating Gas . . . 228
The Birmingham Gas Companies . . . 228
Iron and Coal Trades of Sheffield, South Yorkshire, and North Derbyshire . . . 229
Iron and Coal Trades of South Staffordshire and East Worcestershire . . . 229
Iron and Coal Trades of Lancashire . . . 229
Coal and General Trade of the North . . . 229
Trade Notes from Scotland . . . 229
Glasgow Water Supply . . . 230
St. Helen's Gas Supply . . . 230
Reductions in the Price of Gas . . . 230
Bromsgrove Gas Consumers Company . . . 230

Register of New Patents:—
Applications for Letters Patent . . . 230
Grants of Provisional Protection . . . 230
Notices to Proceed . . . 230
Notice of Application for Leave to File a Disclaimer . . . 230
Patents which have passed the Great Seal . . . 230

THE JOURNAL OF GAS LIGHTING,
WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, FEBRUARY 16, 1875.

Circular to Gas Companies.

We report at considerable length—at much too great length, we fear some of our subscribers will think—the proceedings of the last meeting of the Common Council of the City of London, which relate to the gas supply of the metropolis. They are, however, of importance, since they are concerned with the most gigantic enterprise ever proposed with regard to gas supply, and, moreover, reveal the views entertained on the subject by members of the oldest and richest Corporation in the world—the Corporation of a City regarded as the centre of commerce and the focus of intelligence.

It is commonly believed, and has been repeatedly asserted, that the Corporation of London and the Metropolitan Board of Works are proceeding in this enterprise with perfect unanimity. Two Bills have already been prepared, and a third is being drafted, the provisions of all, we were led to believe, having been settled by the Corporation and the Board in consultation. However this may be, it would appear that the Corporation, as a whole, know nothing about the business, and that their Gas Committee have acted so cleverly and so cautiously, that they are "committed to nothing: they have pledged the Court to "nothing." They have agreed to a Bill, which is so far introduced, that it has passed Standing Orders, "simply as an element "for further consideration, by which agreements may be entered "into; and if those agreements are found, when the time comes "to exercise our judgment upon them, not to be in accordance "with the interests of the Corporation and the citizens, we shall "at once advise the court to withdraw from that position, and to "wash their hands of the whole affair"!! These, as our readers will see in another column, are the words of the chairman of the Corporation Gas Committee, and we commend them to the attention of the Metropolitan Board. Supposing language from the lips of a Common Councilman to bear the interpretation which would be put upon it if uttered by an ordinary tradesman, the meaning of the sentence we have quoted is shortly this:—"We, "on the part of the Corporation, may enter into agreements, "and repudiate them whenever we think it to be our interest to "do so." This is the plain meaning of the chairman's words; but probably he did not intend to say anything like it.

The matter under consideration was really the Metropolis Gas Undertakings Purchase Bill, on the back of which appears the name of the Corporation Remembrancer, along with that of the solicitor of the Metropolitan Board. It must, therefore, be believed that the Bill is promoted jointly. But, as we have already pointed out, the Bill is substantially for the advantage of the Metropolitan Board. They are to buy; they "are to do all "such acts as they may think proper for supplying gas within "the limits" (which include the City of London), and they may sell, by agreement or on arbitration, to the Corporation of the City.

To say that the Corporation are committed to nothing, when the Remembrancer's name is on the Bill, is absurd. In ignorance, or in good faith, the Corporation must be considered to have adopted the Bill, with all its proposals, among which is a distinct proposition as to the price to be paid for the undertakings. This price there are some in the Council who would repudiate, and on what grounds? It is made a charge against the companies that metropolitan gas stock now commands a price which is calculated to give only 6 per cent. to the purchaser. But people are content with this 6 per cent., because 10 per cent. is practically guaranteed on the original capital. Without this guarantee, we shall not venture to say what the price of gas shares would be. But it exists, and on the strength of it a vast amount of property has changed hands, which Parliament will never consent to confiscate.

We are tired of referring to the new issues of capital, but as Mr. Deputy Fry does not seem to understand it, we must once again explain that, in the absence of a provision in a special Act, the law compels the *pro ratâ* allotment of new capital to existing shareholders; and we will go further, and assert that Mr. Fry, if he was a shareholder, would gladly accept his allotment, and make the most he could of it. There is another point as regards capital to which we may here make a brief allusion. It is alleged that some of it is not represented in existing works—that it has, in fact, been lost. We admit this, with a reservation. But Mr. Deputy Fry and others must bear in mind, that the law does not allow of the redemption or paying off of shares. But is the money expended in making the manufacture and distribution of gas the blessing it is found to be to-day, to be therefore considered as wasted? No; for if we started afresh now from the point of the Chartered Company in 1810, gas would be about four times its present price. And when the Chartered Company are mentioned, it should be remembered that they have taught all the other companies the business.

We do not care to follow all the speakers in this debate; but one or two must be referred to. There is, for example, a Mr. M'George, who is reported to have expressed an opinion that the Council "should go to Parliament for a repeal of the Act "guaranteeing the shareholders a dividend of 10 per cent., a "maximum price being fixed, such maximum being always main-"tained, whether the companies paid 10 per cent. dividend or "none at all." Mr. M'George is, we believe, what is called a "warehouseman," and not a manufacturer; but, supposing he manufactured fustian, outside the Common Council we should be disposed to inquire whether or not he is prepared to submit to the terms he would impose on the gas companies. We may thank him, however, for his speech, which will tell when quoted at the proper time and in the proper place. The M'Georges, who cannot or will not take a sensible or reasonable view of things, are, in fact, the best friends the companies have. They serve, like Communists, to keep a Conservative Government in place.

The financial part of the question was but briefly alluded to, and yet it is an important one for the Corporation. The Metropolitan Board, on mortgage of the rates, would be able to borrow at the rate of about 3½ per cent.; but when the Corporation of London came to borrow, in order to buy works of the Metropolitan Board, they would most likely have to pay about 4¼ for the loan. Perhaps a thought of this difference floated in the minds of some members of the Corporation, when they ventured an opinion that, after all, gas-works would not turn out profitable—that is, to gas consumers—for we do not gather that the Corporation have any

desire to make gas consumers recoup their losses on—well, say, the Meat Market—in imitation of the proceedings at Manchester, in which township a number of tablets should be put up in sundry places, bearing in very legible characters the announcement that "This improvement was made at the expense of the gas consumers." There is little more to be said about the debate. It is quite clear that the most intelligent members do not expect much, or anything, to come of the present proceedings. They foresee a large outlay in parliamentary expenses, with a probable continuation of the *status quo ante*. They know full well that gas consumers could not possibly be benefited by a transfer of the undertakings, and they think it better to bear the "(*h*) ills they "have" (even if they agree with a member, who has an appreciative ear for aspirates, that these *ills* may in time become mountains), rather than rush into the abyss of deficit, which will probably be opened should the Purchase Bill be passed.

So far as we are able to judge from the tone of this debate, there is no expectation among the common councilmen that any good will come of this crusade against the gas companies, and we do not think we are far wrong in asserting that a large number—perhaps a majority—of the members of the court, would be glad if they could wash their hands of the whole affair. The Corporation are, however, committed to their younger, but bigger, brother, and the difficulty now is in knowing how to free themselves from his dictation.

No sooner have the Town Council of Nottingham got possession of the gas undertaking, than they fall—we cannot say to squabbling, because there is only one objector, and what he wants is not very clear. The course for the Corporation to pursue is, however, perfectly clear. They have simply to follow the lines laid down by the gas company, and all will go well. Certain works require enlargement; let them be extended as planned. Other works will, in time, require alterations and extensions, and, when the necessity arises, let them be made. The Corporation made an excellent bargain with the gas company, and, if properly managed, and the profits are equitably disposed of, the result must eventually be to the advantage of the gas consumers.

We have often recommended, when a dispute arises between a gas company and a body of consumers, that the former should take the latter into their confidence, and fairly explain all the matters at issue. It is with pleasure we see that the Tunbridge Wells Gas Company have adopted this course, and have invited the consumers and ratepayers to a meeting, which was to take place last night:—

"The directors feel," says the invitation, "that very great misstatements have been publicly made respecting the manner in which their business has been conducted in the past, and that much misapprehension exists as to their policy for the future; and with a view of avoiding the enormous cost of a contest in Parliament, which can only have the effect of keeping up the price of gas, consider, that in thus affording an opportunity to the consumers of gas, and the ratepayers, of learning the correct state of affairs, they are acting in the best possible manner to prevent a wasteful expenditure of the rates, to which shareholders, consumers, and ratepayers alike would have to contribute."

We shall look forward with interest for the result of this meeting. No doubt it was interrupted by agitators from the Town Commissioners; but, having a firm belief in the honesty and intelligence of the directors of the gas company, we have little doubt that they succeeded in satisfying the ratepayers that the course they are pursuing is a just one.

The Gas Committee of the Corporation of Liverpool have received a report from the borough engineer, showing the quality of the gas supplied by the United Company from 1857 down to the present time. The facts, we should state, are drawn from the records of the gas inspector's department. In the earlier period, the illuminating power of the company's gas appears to have been high. In 1865 they obtained an Act which fixed the quality at 20 candles, and in that year it averaged 24·10 candles. But in 1872 the quality was not maintained, the average illuminating power being only 18·27 candles, and in the following year it was but 15·60 candles. Matters did not improve until the latter part of last year, when the gas was again brought up to the standard, and, indeed, considerably above. It does not appear that any proceedings were taken against the company when the gas was of such inferior quality. The Liverpool Gas Act requires the gas to be tested with a burner consuming 5 feet per hour, but the Corporation examiner seems to have tested with a consumption of 4 feet, and calculated the result by direct proportion. Mr. Deacon candidly admits that in this way some injustice was done to the company:—

Eight sets of experiments have been conducted for the purpose of determining the relative illuminating power of the 4 and 5 feet burners when consuming the gas recently supplied, the mean results being—5-feet burner, 22·012; 4-feet burner, 20·084. These figures show that the use of the 4-feet burner must, *cæteris paribus*, have given an illuminating power for the gas lower than that of the 5-feet jet employed by the gas company, and required by the 10th section of the Act of 1865. The method adopted by the Corporation up to June, 1874, of obtaining the illuminating power of the gas by means of a 4-feet burner, and calculating therefrom the power of a 5-feet burner, have given a somewhat lower result than would have been obtained by the use of a 5-feet burner, as required by the Liverpool Gas Company's Act, 1865.

The report goes on to allege a deficiency in the supply to public lamps, and the occasional presence of sulphuretted hydrogen in the gas. To all these complaints we expect the company will have an answer. The chairman of the committee, as our readers know, is very anxious to have the works transferred to the Corporation, and he promises a further bill of indictment against the company.

The Corporation of Norwich have resolved to present a petition against the Bill of the British Gas Company. They are not, however, violent in their opposition, and, as the company seem disposed to make concessions, we expect that matters will be arranged without a contest, which would only benefit the lawyers. In the Bill, we have already noticed, the company propose a dividend of 7½ per cent. on the new capital they require; but they now express their willingness to take 7 per cent. This is, however, too much in the eyes of the Corporation, who wish the company to raise the money they want by debentures. The statutory illuminating power of the Norwich gas is now 11 candles: but the company propose to raise it to 14 candles, without any increase of price. This does not satisfy the council; they want 15-candle gas, and the company decidedly object, on the ground that the extra candle would cost them 3d. per 1000 feet. The company concede a purity clause, allowing 30 grains of sulphur and 5 grains of ammonia per 100 feet, which ought to satisfy the council, whose other objections need not be noticed.

The Pottery towns appear to have been badly supplied with gas, and at Newcastle especial complaints have been made. The gas company allege the difficulty of getting a proper supply of gas coal, and the necessity of using, at times, any sort they could lay their hands upon. The long frost, too, had its usual effect, and everywhere, in these rapidly growing towns, there is the difficulty of keeping pace with the demands, without incurring expense which would hardly be justifiable.

The Local Board of Heckmondwike have been smitten with the desire to become possessed of gas-works, and are endeavouring to incite their neighbours at Liversedge to join them in the enterprise.

By the kindness of Professor Würtz, we are able to publish an elaborate description of his "New Processes in Proximate Gas Analysis," the first part of which appears to-day. Any criticism of the processes would be out of place here, and we can only submit them to the judgment of our readers.

The York Gas Company, it will be seen in another column, have to take the greater part of the money required for the usual dividend from their reserve-fund. Still they do not propose to make any advance of price, which is to continue 3s. per 1000 feet. The directors are determined to retain possession of their property, and the Corporation of York will probably come to the conclusion that they could not do better for the consumers than the company are doing.

Water and Sanitary Notes.

The directors of the East London Water Company have given notice that they propose, on and after the 1st of July next, to give a constant supply of water in two additional districts. Since public attention has recently been drawn to the matter, these notices may perhaps receive more consideration than was given to the earlier announcements of the company.

Our readers may remember that, early last year, the Society of Arts appointed a special committee, who took evidence and reported on the best means of preventing fires, and of obtaining a constant supply of water in the metropolis, and one or two other things. The report and the evidence were ordered by the House of Commons to be returned to the House, and the paper has just been issued. There is, of course, very little that is new in the suggestions made. All agree that a constant supply is desirable, and, with that, hydrants become a simple necessity. We have, in the evidence of Mr. J. Quick, additional testimony to the apathy displayed by the local authorities in the matter of fixing hydrants on the leading mains of the water companies, which are always charged under pressure, and the positive objection made by the Metropolitan Board to arrangements, proposed to be carried out at the expense of the water companies, which would have ensured the attendance of a turncock with a fire-engine. The sole objection to the placing of hydrants is, we believe, their expense; but Mr. Bateman told this committee that the best he is acquainted with only costs 30s., and may possibly be had for £1. Mr. Rawlinson, however, puts the cost at £4 each. The objection to the introduction of a general constant supply is also the cost of making necessary alterations in fittings. These, under present circumstances, would, of course, have to be made at the expense of owners and occupiers; but the Society of Arts propound a scheme by which they might be made at public expense, without a rate. They calculate that the con-

solidation of the water companies would result in a saving of £100,000 a year, and this sum they would devote to relieve the consumers of water from the expenses of altering their house services, and to defray the cost of hydrants. The notion is to place the administration or the water supply of the metropolis in the hands of a Special Commission. As the subject is to be brought forward again by Colonel Beresford, in the course of a few days, we need say no more about it at present.

The chairman of the Blackburn Water-Works Company, at the annual meeting held last week, expressed a candid opinion that water-works in large towns should be in the hands of the local authorities, and he is disposed to sell if the Corporation offer fair terms. Those already offered, we understand, are 9 per cent. perpetual annuities; but the company stand out for 10 per cent. The undertaking is very profitable, and we have no doubt the company will get their own terms should the Corporation be earnest in their desire to purchase.

The Wakefield Water Bill is to be opposed by the Normanton Local Board, who are constructing works to supply themselves, which, it seems, the Bill will give the Wakefield Company power to appropriate. The ratepayers of Normanton will probably discover that they can be supplied more cheaply by a large undertaking than a small one, and accordingly come to terms with the Wakefield Company.

The Town Council of Newcastle have resolved to open negotiations with the water company for the purchase of the works, at the same time inviting the co-operation of Gateshead. The resolution was opposed by those who desire to set up competing works, which it was clearly explained to them they could not do, unless some alteration were made in the law. And that reminds us to mention that, from a recent speech of the President of the Local Government Board, we gather that the Government will not support a measure for the repeal of the Borough Funds Act. The fact is that people are everywhere becoming alarmed at the rapidly increasing debts of local authorities, which, if the Act we speak of were repealed, would be enormously added to without the consent of the ratepayers. At Blackburn it is now urged "that the mortgage debt, if it progresses as it has done "in the last few years, will be overwhelming, and will have a "tendency to paralyze trade in the borough." And what if the spinning and weaving of cotton be largely transferred to Bombay within the next quarter of a century?

We have received, but have not space this week for, the reply of the Kent Water-Works Company to the letter of the Metropolitan Board. It is the usual story; but there is this to be added, the Metropolitan Board have put up 30 hydrants in the district, on the requisition of the Company, who have power, under certain conditions (Metropolis Water Act, 1871, s. 34), to provide hydrants, and compel the Board to pay for them. We may here express a regret that the other water companies have not acted on the power given by this provision.

THE WATER BILLS FOR 1875.

The *Stockton and Middlesbrough Water-Works Bill* is to extend the limits of the Stockton and Middlesbrough Water-Works Company, and authorize the construction and maintenance of additional works for the abstraction of water from the river Tees. The present capital of the company is £250,387 10s., in six classes of shares, and all fully paid up. These it is proposed to consolidate into stock. Power is sought to raise £300,000 additional capital, the dividend on which is to be limited to 8 per cent. if ordinary, and 6 per cent. if preference shares or stock. Borrowing powers to the usual extent are asked.

The *Wakefield Water Bill* is to extend the limits of the Wakefield Water Company, for the future to be designated the Wakefield District Water-Works Company. Power is also sought to purchase the works belonging to the directors of the Holme reservoirs on terms agreed upon, and to construct some additional works. Various provisions are inserted relating to the supply of compensation water to millowners, but as these are only of local interest, they need not be noticed. The company propose to raise additional capital to the amount of £301,300, carrying the ordinary borrowing power. The dividends on this new capital are to be limited as usual. The Bill is further to confer some ordinary powers for the recovery of rents and the prevention of waste.

The *Weardale and Shildon Water-Works Bill* is to extend the limits of the Weardale and Shildon Water-Works Company, and authorize the construction of additional works. It is further to authorize the purchase of water-works belonging to the Local Board of Spennymoor. The present capital of the company is £150,000, and they now seek to raise additional capital to the amount of £600,000, carrying the usual borrowing power. No limitation of dividend is proposed.

The following are Bills promoted by local authorities, and having relation to water supply:—

The *Ashton-under-Lyne, Stalybridge, and Dunkinfield (District) Water-Works Bill* is promoted by a joint committee of the Local Boards to obtain an extension of time for the compulsory purchase of lands, and an earlier transfer to the combined authorities of certain works constructed by some of them.

The *Birmingham Corporation Water Bill* is to authorize the Corporation to purchase the undertaking of the Birmingham Water-Works Company. The actual paid-up capital of the company now consists of £420,000, entitled to 8 per cent., and £201,600, entitled to 7 per cent. For this capital of £621,600 the Corporation propose to pay either a gross sum of one million pounds, or annuities at a rate to be agreed upon or fixed by arbitration in respect of each share, power being asked to redeem the annuities at any time on payment of 20 years purchase. The Corporation further seek power to borrow any amount of money they may think necessary for the purposes of this Act, which is to be paid off within 100 years. Power is also sought to devote a portion of revenue to the formation of a reserve-fund not to exceed £50,000, and to carry surplus profits to the borough fund.

The *Greenock Water Bill* is promoted by the Water Trustees of Greenock to obtain power to increase the capacity of Loch Thom, and execute other works to give a better water supply in their limits. The trustees seek power to raise for the purpose an additional sum of £65,000. The existing debt, we may mention, is £344,800, and the revenue last year was £19,131 8s. 6d.

The *Hamilton Water-Works Bill* is to transfer the present local water undertaking from a body of commissioners to the magistrates and Town Council of the burgh of Hamilton. It is further to authorize the construction of new works, and the borrowing of money on mortgage and cash credit to the amount of £20,000.

The *Manchester Corporation Water-Works and Improvement Bill* is, so far as it relates to the water undertaking, to enable the Corporation to make extensive additional works, for which power is asked to borrow a sum of £500,000. Most of the other provisions are to authorize street improvements, and to compel the amendment of the morals of the inhabitants, and, therefore, need not be noticed in our columns.

The *Oldham Corporation Water-Works Bill* is to authorize the Corporation to relinquish certain water-works, sanctioned in 1870, and which are now regarded as insufficient to furnish an adequate supply, and to empower the Corporation to construct and maintain other and more extensive works. The Act of 1870 authorized the Corporation to borrow £200,000, partly for gas, and in part for water-works purposes. By the present Bill they seek authority to raise a further sum of £250,000. Beyond authorizing the works, the Bill is only to confer some ordinary powers on the Corporation.

The Ossett-cum-Gawthorpe Local Board Bill is, among other things, to authorize the Board to buy water in bulk from the Batley Corporation, and maintain works for its distribution within their own limits. The Board are to pay 8d. per 1000 gallons for the water. It is proposed to raise £20,500 in respect of the water undertaking; and, as regards supply, the Bill is to give all the usual powers. Besides this, the Bill is to authorize some street improvements and sewerage works, including the acquisition of lands for irrigation or other purposes.

The *Oxford Corporation Water-Works Bill* is to authorize the Corporation to supply water to the city of Oxford and the neighbourhood. It seems that the Corporation have been giving a supply for the past 60 years, but not with statutory powers. This Bill will confer all the usual powers, and enable the Corporation to raise £19,000, with the consent of the Lords of the Treasury. The works to be authorized are an additional reservoir, with the necessary mains.

The *Pemberton Local Board Bill* is to authorize the Board to construct and maintain works for the supply of water to their own district, and to that of the Local Board of Orrell, who are not to take less than 45,000 gallons a day, nor more than 60,000 gallons. For this quantity the price is not to be more than 8d. nor less than 5d. per 1000 gallons. The rates proposed are about the same as those usually sanctioned. The Bill is further to give the Pemberton Board power to borrow £34,000, and to confer all the usual powers and privileges as regards the supply of water.

The *Rotherham Corporation Bill* is to empower the Corporation to raise a further sum of £25,800 for water purposes. No new works are proposed, and the other provisions of the Bill do not relate to the water undertaking.

GREENWICH CONSUMERS GASLIGHT AND COKE COMPANY.—At the meeting of the Metropolitan Board of Works on the 5th inst., a letter was received from the above company, inquiring whether, in the event of their applying to Parliament for an Act to enable them to manufacture and supply gas for Greenwich, the board would oppose the movement. The letter was referred to the Works Committee, who, last Friday, made a report thereon, recommending that the company be informed that the board are unable to express any opinion on the subject until they have had an opportunity of seeing the proposed bill.

A TREATISE ON THE SCIENCE AND PRACTICE OF THE MANUFACTURE AND DISTRIBUTION OF COAL GAS.

LI.

The Station-Meter.

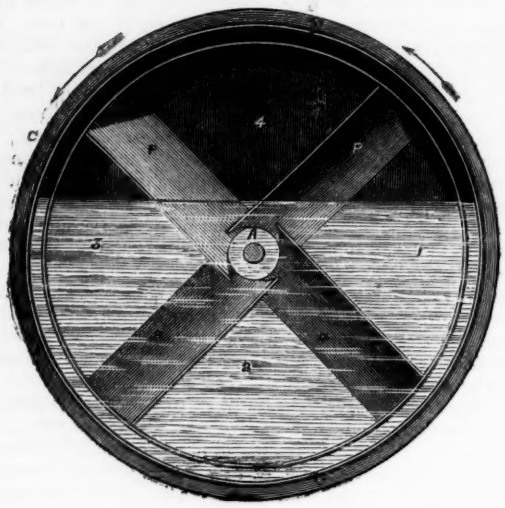


Fig. 5.

Fig. 5 shows another section of the same meter. The case, C, is charged with water to the required height, as indicated. The wheel is divided into four distinct measuring chambers, numbered 1, 2, 3, and 4, by means of the partitions, *p p p p*, which are placed at angles with the line of the axle, for the purpose of diminishing and equalizing their resistance when passing through the water. If the partitions were placed straight with the axle, the obstruction would be such as to render the instrument entirely useless, on account of the excessive oscillations of the lights supplied thereby.

As already represented in fig. 2, the chamber, when in the position of that numbered 4, is filled with gas; its inlet and outlet being both sealed by the water. If we suppose now the meter to be in action, the gas will enter the chamber 1, and, acting in the same manner as described in Clegg's rotary holder, when filling cause the wheel to revolve in the direction of the arrows, expelling, in the first place, the gas from chamber 3, so that, when the outlet of 4 rises above the water, the gas will issue from that chamber. In the meantime, the chamber marked 1 gradually rises, increasing in capacity, and when this is nearly full of gas, chamber 2 comes into operation. This action is continuous, all the chambers being filled in rotation, at the same time expelling the gas from those preceding them. Here the method of giving motion to the wheel by hand, as proposed when describing fig. 2, is superseded by the force or pressure of the gas; and so long as this is maintained, and any supply is obtained from the meter, its action is continuous.

Hence the contents of one revolution of the wheel being known—say, 1 cubic foot—it can be readily understood how, by simple gear-work, such as wheels and pinions, the quantity of gas passing will be recorded on the index, with the most unerring accuracy, during a period of many years, depending on the duration of the instrument, and the maintenance of the water-line at the proper height.

When constructing meter-wheels, their approximate capacity is obtained by calculation; but the exact position of the "water-line" is ascertained by experiment. It is then carefully marked on the front of the case, so that, in the event of the gauge being broken or lost, the mark is always retained. With the same object, some manufacturers attach a brass plate to the case, having the words "water-line" engraved thereon; others have it marked on a brass tube which surrounds the glass of the gauge, a space being left for observation.

Prior to the Sales of Gas Act, manufacturers generally constructed the wheels of meters of such capacity that the quantity of gas necessary for the maximum number of lights for which they were destined—each light consuming 5 feet—was delivered by 100 revolutions of the wheel per hour. Thus the quantity for 10 burners was 50 feet; this divided by 100 gave half a foot as the contents of each revolution of a 10-light meter wheel; and this rule was applied to all sizes (the 3-light excepted), whether for consumers or station-meters. By the Act referred to, the quantity stipulated for the consumption of Argand burners is 6 feet per hour, but manufacturers did not increase the capacity of the wheels of meters; so that the only practical alteration in this respect, produced by the Act, has been to diminish the capacity of the station-meter wheel, for this, as now constructed, works at the rate of 120 revolutions per hour, instead of 100 as formerly. Thus a wheel of 10 feet capacity is considered sufficient to supply 1200 feet per hour. This is the basis of calculation of some of the most eminent makers of these instruments, to which there can be no objection so long as the working pressure is not increased. Whenever a meter is made to supply a greater quantity of gas than it is calculated for, the pressure required to work it is augmented in proportion. Thus a 5-light meter will deliver 25 feet per hour, with a loss of pressure between the inlet and outlet of about 1½-10ths; but if 50 feet be passed through the same meter, the loss of pressure will be increased to 6-10ths or 7-10ths, and from that point, by any additional supply of gas, the pressure necessary to work the meter is very materially augmented. For this reason, station-meters should always be of ample capacity for the production of the works.

As already stated, in order to render the meter operative, it must be charged with water to a certain height, called the "water-line," and whenever the water within the case is above this point, the capacity of the wheel is, in consequence, diminished, and the instrument indicates a quantity of gas greater than that which has passed therethrough. It is then technically termed "fast." If, on the other hand, the level of the water is below its proper position, the wheel is increased in capacity, the meter indicates less than the quantity passed, and is "slow."

To illustrate this variation of measurement, we will imagine the annexed diagram to represent a meter-wheel, with its four measuring chambers, and, for the sake of facility of explanation, we will sup-

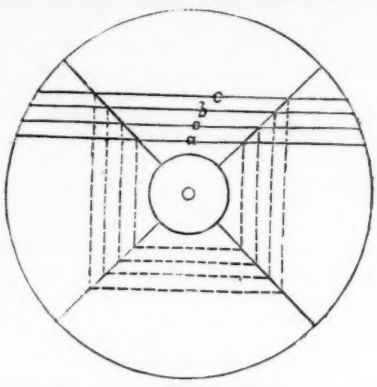


Fig. 6.

pose this about 13¼ inches in diameter, its superficial area being 136 square inches, and its depth 1 inch, thus making 136 cubic inches. It is evident that, whatever may be the depth, whether 1 inch or 6 inches, the capacity of the wheel will be alike affected by any alteration of the water-line; we have, therefore, for simplicity of illustration, imagined the wheel of that limited depth.

Now, if we suppose the proper water-line to be that marked *o*, and situated exactly 3 inches above the centre of the axle, then, in the revolution of the four chambers, the space occupied by the water within the wheel would represent a square, as shown by the corresponding dotted lines, each side of which would be 6 inches. Consequently, in the revolution of the wheel, 36 cubic inches would have to be deducted from its capacity, thus making the quantity of gas received and expelled at each revolution 100 cubic inches.

But if the level of the water be raised 3½ inches, to the point marked *b*, then a square of 49 inches would have to be subtracted from the area of the wheel, thus rendering the meter 15 per cent. "fast;" and if the level of the water be further elevated to the point *c*, which is 4 inches above the centre of axle, under these conditions the index would register 100 feet, whereas only 72 feet of gas would have passed.

On the other hand, whenever the level of the water is below the proper line, then the meter registers "slow;" for if we suppose the water to be at the point *a*, 2½ inches from the centre of the axle, then only a square of 25 inches, or 25 cubic inches, would have to be deducted from the total capacity of the wheel, and the meter would be about 12 per cent. slow, or, in other words, it would register 100, whereas 111 cubic inches of gas would have passed therethrough. On further abstracting the water from the meter to the centre ring, the wheel would become unsealed at the centre opening, or the centres of the partition, and be rendered ineffective and useless.

When describing the results of different water levels in the meter, no attempt has been made at mathematical accuracy; the angular position of the partitions of the wheel, and the quantity of gas contained in the inlet-hoods or passages, would render the calculation too complicated for our purpose; but, it may be observed, the variation described, under the conditions mentioned, is actually less than really takes place.

Some years ago, when the instrument was not so well understood as at present, it was by no means uncommon to meet with consumers meters of the smaller sizes with the spouts of such extravagant height that the meter could be overcharged to such an extent as to register 30 per cent. fast. Singularly enough, there were consumers who always insisted on charging their meters to the highest point, with the belief that by so doing they were obtaining an advantage over the company. This class of consumers looked with the greatest suspicion and distrust upon the operations of the company's inspector, who, when taking the index, would withdraw the surplus water. But the moment his back was turned, the consumer, determined "not to be done by the company," would again charge the meter to the full, and delighted with his cleverness, and having the satisfaction that he had benefited by his cunning, would pay his account with pleasure. But still more remarkable, it was utterly impossible to make this class of people understand the truth, that they were by this means really cheating themselves.

In consumers meters, at the present time, due provision is made to avoid any of these discrepancies (except under very peculiar circumstances, which are unfavourable to the company), the extreme variation one way or the other, either to the advantage of the consumer or the company, not being more than 2 or 3 per cent., as

limited by the Sales of Gas Act. By the recent improvement in these instruments patented by Messrs. Warner and Cowan, to which we shall have occasion to refer, the wheel is so constructed as to register, within a certain range, practically the same under all the various positions of the water-line.

The causes of the friction or pressure required to work a meter are not generally understood, hence we find that various absurdities have, from time to time, been patented in order to diminish this. Amongst these, glass bearings for the axles have been proposed; but it must be evident, from the great facility with which a meter-wheel revolves in its case when empty, and the difficulty with which it moves when charged, that the cause of obstruction must be the water, concerning which we will make a few observations.

As already stated, the partitions are placed at angles; therefore, in revolving in the water, they form a kind of vane or screw, and whilst in action draw continuously a portion of water through the centre opening, which water is expelled at the back of the wheel. A similar result, although to a very slight degree, is effected by the inlet and outlet hoods, in consequence of their angular position. Under these circumstances, therefore, the orifice in the hollow cover should be left as free as possible, in order that the water may pass therethrough, its dimensions being an important point in the construction of station-meter wheels. Further, in the construction of a meter-wheel so that it may work with a minimum of pressure, care should be observed to make the passages at the centre, communicating between the various chambers, of ample capacity, so that the water may flow freely into and from the chambers during the revolution of the wheel. By inattention to these points, the friction or pressure required to work the meter is materially increased, and by due regard thereto it may be in like manner diminished.

The accompanying engraving (fig. 7) represents a station-meter, with cast-iron cylindrical case, suitable for a small work. It is mounted on a pedestal of brickwork or masonry, with the object of

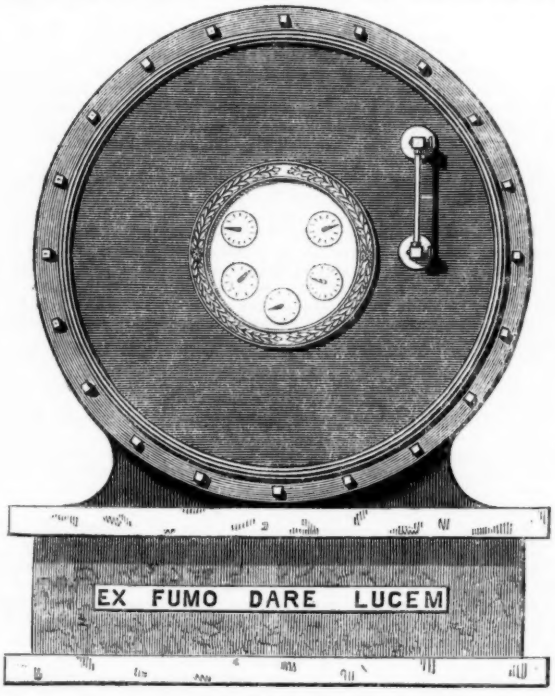


Fig. 7.

bringing the index to the level of the eye of the observer, also for the sake of ornamentation, which is at all times desirable in a gas-work, when attained at moderate cost, as it creates a feeling of care, cleanliness, and order among the men who have charge of the apparatus.

It may be here observed that the general appearance of a gas-work is invariably a good indication of the operations of the company, for wherever there exists untidiness or disorder, there is sure to be waste, bad management, and loss. The same observation applies to any other business, but there are few kinds of industry that offer such facilities for waste and loss as a gas-work. In establishments of magnitude, hundreds or thousands of tons of coke may pass uselessly and imperceptibly away from the furnaces annually, according to the settings of the retorts, without showing the least indications of the loss, except by the returns of the sales. An increase of only 5 per cent. in the fuel account of one of our largest companies would represent about 4000 tons of coke per annum. In small works, losses from this cause are more likely to occur, in consequence of a want of experience in retort-setting. If our attempts, therefore, to excite feelings of care and order, are successful in this one point, it will naturally be to the advantage of gas companies in the general management of their works.

To return to the station-meter, the index is in the centre, and is provided with five enamelled dials, with their corresponding wheel-work and hands, which indicate respectively, at each revolution of their pointers, 1000, 10,000, 100,000, 1,000,000, and 10,000,000 cubic feet. In very small station-meters, sometimes the first dial indicates 100 feet only in the revolution of the pointer, whilst those of large dimensions have dials of higher denomination than stated, depending on the magnitude of the works in which they are employed.

The water-line gauge, as represented, for reasons already stated, is indispensable. This is connected at the top and bottom with the interior of the case, so that the level of the water therein can be always observed; and, to ensure accuracy, it is imperative that it should be maintained at the proper position.

A weak point existing in some station-meters is the facility with which the water level can be raised, a circumstance at times taken advantage of by unscrupulous persons, in order to show a pretended increase in the production of gas per ton, and their own feigned superior abilities. These instruments, however, are constructed by the best makers so as to prevent such deception, by placing an overflow-pipe, the mouth of which is at the water-line. This pipe passes into a drain, so that any excess of water flows off from the meter.

For the purpose of preserving the meter, as well as to prevent the water therein becoming contaminated with ammonia, which would be communicated to the gas in its passage, it is desirable to have a small stream of clean water, proportioned to the make of gas, passing continuously through the instrument, the overflow-pipe mentioned carrying off the surplus. This plan is adopted by some makers, and should be applied by all.

It is essential that the station-meter should be perfectly level from back to front, and the centre punch marks made across the front by the manufacturer should also be horizontal. Neglect in either of these points will affect its accuracy.

Station-meters for small and medium-sized works are constructed with cast-iron cylindrical cases, as described, often with the back-plate cast together with the cylinder in one piece—a system to be recommended for economy. The largest of these which has come under the writer's notice was 8 feet in diameter, and about the same depth, for the delivery of 20,000 feet per hour.

By some manufacturers the larger size cylindrical cases are made in segments, with flanges, and put together with bolts and nuts, and cement joints—a very expensive plan, which, if possible, should be avoided. Within the last few years such progress has been made in loam moulding, that there are few ironfounders who are not capable of producing the cylinders necessary for station-meters cast in one piece.

In large station-meters the connecting-pipes, inlet and outlet, are always provided with valves; there is also a bye-pass valve on the main, or a combined arrangement for the purpose. Thus, in the event of an accident occurring to the meter, it can be thrown out of action immediately, and disconnected for repairs, without interfering with any other part of the works.

This arrangement is very desirable for large works, but in very small establishments, where everything that tends to increase the capital must be avoided, these valves and bye-pass for the meter can be consistently dispensed with. Interruptions to the proper action of station-meters are so exceedingly rare, that the writer, during a long experience, never saw or heard of one; but he has more than once experienced the inconvenience of a plurality of valves in a small work, for, in the absence of the men in charge, officious meddling persons have sometimes shut a valve, and caused some little confusion. Moreover, suppose a meter in a small work to break down, all that is required is to open the tap or plug attached thereto, and allow a portion of water to flow off, when the gas will pass freely, and it will be no inconvenient matter to stop the charges for a short time whilst the meter is disconnected. For these reasons the writer considers the valves and bye-pass to the meters of small works neither necessary nor desirable.

(To be continued.)

Correspondence.

STEAM-JET EXHAUSTERS AND SCRUBBERS.

Sir,—In your issue of Oct. 27, you gave a description of the steam-jet exhauster, and steam scrubbers, which were being erected at a large gas-work in this neighbourhood. I have the pleasure of informing you that the apparatus has been in operation since Nov. 16, and has proved a decided success.

The exhauster we found capable of passing 72,000 cubic feet per hour through a 3-inch induction-pipe, with a steam nozzle of $\frac{3}{8}$-inch bore. The vacuum-gauge on the main from the retort-house, and all the gauges from that onward to the gasholders, are motionless under ordinary circumstances, showing the unusual steadiness of the force. Consequently, we work with less dip in the hydraulic main than we dare do in that section of the works where other exhausters are used. The advantages of this in increased production per ton, reduced deposit of carbon, and lengthened duration of retorts, need only be named to the practical reader. The absence of all noise is also characteristic.

The steam-scrubbers, although entirely novel, are almost equally successful. They are charged with stiff shavings, in thickness about 22 Birmingham wire gauge, made from half-inch pine boards. These, it had been found, remained uncompressed and open, in a column of 9 feet high, and 12 inches diameter (supported only at the bottom), even under a heavy and continuous shower of gas liquor. These, or such-like, shavings, have been preferred as scrubbing material, because of the high degree to which they combine the advantages of large surface, small cost in proportion to surface, extent of angular outline, lightness, and slight resistance to the passage of the gas. With the aid of the butterfly-valves, we have no difficulty in equalizing the flow of gas through the columns, which divide it into 44 separate streams. When the valves are once set to the proper angle, they require little or no attention. The difference in pressure between the outlet and inlet of the scrubbers, when doing their full work, is inappreciable, being under one-tenth of an inch; and, in consequence of the constant cleansing power of the mixed steam and gas, this difference does not increase. These scrubbers

will work for an indefinite length of time without requiring to be opened.

The results obtained are, effectual purification from ammonia, and the complete arrest of tar, oil, and water before the gas reaches the oxide of iron purifiers, so that these remain quite dry. The effect on the illuminating power was fully established four years ago, as announced to your readers, by a series of comparative photometric experiments extending over nine months, and showing the average of the "steam gas" to be distinctly and decidedly superior. More recent experience has not unsettled that conclusion.

The active means by which these results are obtained from the scrubbers cost nothing. There is no expenditure for steam or water, as the steam that has passed through the exhauster, and done its work there, supplies the sole fluid provided for scrubbing, and the resistance in the scrubbers is practically nothing. There are no pumps, distributors, engines, or other moving parts whatever, all the work being done by the condensing, or condensed, steam in its slow descent through the columns. In short, while the apparatus is considerably less in first cost than other forms of scrubbers, with their appliances, the working expenses are *nil* sometimes.

Two objections frequently made against the steam-jet are, that it will "pitchify" any tar remaining in the gas, and that when coal only is used, especially at high heats, naphthaline, with its attendant troubles, will speedily appear. Four years experience, under very varied circumstances, has proved the first objection to be groundless. The temperature of the mixed steam and gas, as they issue from the exhauster, is quite too low to produce any such effect. As to the second objection, I can only say, at present, that, having recently, for several weeks in succession, worked the steam-jet exhauster and scrubber with coal gas alone, made at very high heats, and having during, and at the end of, that period, examined the apparatus and mains leading from it, at various points, we have found no signs of naphthaline, or any other obstructive deposit.

Messrs. Körting Brothers, of Hanover and Manchester, are my sole licensees for the steam-jet exhauster and scrubber. Mr. Ernst Körting has invented and patented an improvement on the "multiple" arrangement of steam-jets, for gas exhausting, previously patented by me. This improvement consists chiefly in ingenious means of altering, at will, the number of the induction-pipes in action—that is, the capacity of the exhauster—whence is anticipated a more facile and exact adjustment of the steam to the quantity of gas passing, and also a corresponding economy in fuel.

An exhauster, with Mr. Ernst Körting's adjusting apparatus, is being erected in connexion with a second set of steam scrubbers, so that we hope for still greater advantages both in exhausting and scrubbing. The fact may interest your readers, that within the last 18 months, Messrs. Körting have supplied their steam-jet exhausters to about 100 gas-works in Germany and elsewhere, and that from the reports of various engineers, with whom we have communicated, they seem to be giving great satisfaction everywhere.

WM. CLELAND.

Liverpool, Feb. 2, 1875.

BRICK OVENS.

SIR,—In the history of gas lighting issued in your JOURNAL, the author does not say who was the original inventor of those settings known as "Clift's ovens." As I am anxious that honour should be given to whom it is due, and have heard surmises about that, probably some of your many readers might be familiar with that subject, and thus bring to light those spirits "born to blush unseen," and so stir up the rising generation to leave "footprints on the sands of time," and help on the brotherhood.

ANDREW GIBB.

Gas-Works, Oswestry, Feb. 6, 1875.

METER-INDEXES.

SIR,—I am much indebted for the replies, in your last week's issue, to my letter on "Meter-Indexes," but I am somewhat disappointed that not a single person has been found to advocate the continuance of the imaginary figures, and give the benefit of that experience to the "gas world." Of course, this I do not wonder at; still it leaves me so very singular, and I have a personal hatred at being odd.

The letters by Mr. Magnus Ohren and "Nemo" are correct and conclusive, but I should like to say just a word as to the valuable letter by "T. D. H.," "A Country Manager in England." It is evident, since coming across the Border, that his experience has been anything but pleasant, and that the practice he has abolished in his works was anything but a help to him in ascertaining the true quantities consumed, but, on the contrary, it prevented him from knowing when meters had ceased to register, and was a source of innumerable errors and vexatious trouble. He appears to have a "backbone" in him, and to be the "backbone" of the works over which he is manager, in which case there is some hope of his results being successful. He also evidently makes out his own accounts, thus detecting errors in time. In my case, I have nothing whatever to do with accounts, and merely see that the meter-indexes are taken, and handed over to the clerks for the computation of the accounts and issuing them. In cases where the manager is powerless to make necessary alterations at his own discretion right away, without laying these matters (properly belonging to his jurisdiction) before his directors, the "backbone" of the whole fabric is rendered feeble, and the result of the general working must be equally so.

I trust, by the next issue of your JOURNAL, to have a reply from one who uses the practice, and approves of the same, as complained of by

"A COUNTRY GAS MANAGER.

Feb. 10, 1875.

USE AND VALUE OF CARBON.

SIR,—Will any of your readers kindly inform me if they are so fortunate as to sell their carbon, which, in a work using Newcastle coal, and having no exhauster, often accumulates in no small quantities? and if a good price could be got for it, we would not feel so much to see, in some cases, unavoidably thrown away what constitutes the basis of all illuminating gases.

Some years ago I noticed in your JOURNAL a remark made by a manager, who said he got £1 per ton for his carbon, and from that fact affirmed that in his case an exhauster was unnecessary.

I have heard that carbon is used in some foundries for dusting on fine moulds to ensure a good casting (after being ground to a fine powder), also in crucible making, yet I cannot get any definite information on the subject, and will therefore feel greatly obliged to any one who can enlighten me as to what its uses are, if any, and its value per ton.

T. D. H.

Feb. 10, 1875.

STANDARD OF PRESSURE.

SIR,—In the bill for the regulation of the metropolitan gas companies, noticed in your last issue, I notice that no mention is made of pressure. Is it proposed to ignore this? In the amendment of the Metropolis Act, 1860, clause 84, "All gas supplied by a company to a private consumer shall (except in case of accident or repairs) be supplied at such pressure as to balance from midnight to sunset a column of water not less than 6-10ths of an inch in height, and to balance from sunset to midnight a column of water not less than 1 inch in height, *at the main, as near as may be to the junction therewith of the service-pipe supplying* the customer's house, building, or lands."

"If a company fail in any case to comply with this section, they shall, for each day on which they so fail, be liable to a penalty not exceeding £10."

This clause is inoperative, because it is not possible to test pressures *at the main*.

I would suggest it should be *at the inlet of the consumer's meter*, and that at each police station a self-acting pressure recorder should be fixed. By this means this, to my mind, most important question could be controlled. On the continent as much attention is paid to controlling the pressure as to the quality and purity.

HODGSON JONES.

25, *Old Broad Street, London, Feb.* 12, 1875.

MR. MANN'S PATENT FOR "SULPHUR" PURIFICATION.

SIR,—In last week's number of your JOURNAL, the author of the "Treatise on Gas Manufacture," in making mention of Mr. Mann's patent for "sulphur" purification, remarks on the "want of precision" in the process as described in the patent, and states that any gas manager would be "rather confused" in attempting to work it. But it is also to be observed that there is a fundamental and fatal defect in the process at its very outset.

Mr. Mann proposes to pass *crude* gas into a single lime vessel, and then says that the contents of the vessel are thereby converted into sulphide of calcium; whereas by such a process he will only get *foul lime*, which is a very different substance. As crude gas contains from 2 to 3 times more CO_2 than SH_2, and as the CO_2 has the greater affinity for lime, it follows that little more than one-fourth of the lime in the said vessel will be sulphuretted, the remaining three-fourths being carbonated.

Mr. Mann does not specify for how long the crude gas is to be passed into this single lime purifier, nor does he give any explanation to guide one upon this important point; but the result which I have stated (viz., little more than one-fourth of the lime sulphuretted) is *the best that can possibly be attained*. Moreover, as sulphuretted lime is rapidly desulphuretted by the CO_2 in the gas, if the shutting off of the gas from this lime purifier were not done exactly at the right moment, there would not be any sulphide of calcium in the purifier at all, the whole of the lime would be carbonated, and thereby be incapable of absorbing sulphur in any form.

R. H. PATTERSON.

21, *John Street, Adelphi.*

COATING GAS-MAINS.

SIR,—Will you allow me to ask, through the medium of your JOURNAL, whether any gas companies are in the habit of dressing main-pipes, either inside, outside, or both, with tar or pitch, before laying them? Also what would be the probable cost, and supposed benefit, of so doing?

JAMES ELDRIDGE.

Richmond Gas Company, Surrey, Feb. 12, 1875.

VARIATIONS IN THE REGISTRATION OF DRY METERS.

SIR,—Your correspondent, "Nemo," will, I think, find the cause of the loss he mentions to be brought about by the valves being blown off their seating, and thus allowing a quantity of gas to pass unregistered. I believe dry meters are condemned by many engineers who have taken the pains to test them carefully, and I believe the most successful gas company in London has for some years refused to lend them. I never lend them, but frequently place a compensating wet meter by the side of the consumer's dry meter, so that I may be satisfied as to the correct measure of the gas. If "Nemo" will do this, I think the result will surprise him. One of the best tests to put dry meters to, is to attach them to public lamps, the burners and regulators being regulated to pass the same quantity of gas. I did this, some years back, to satisfy the lighting inspectors in my town. There were 74 lamps, and 7 dry meters of the best known make, were put in at as nearly the same level as possible. After a few months working, the meter indices gave the following results:—

1.	2.	3.	4.	5.	6.	7.
9340 ..	6470 ..	2360 ..	1510 ..	6360 ..	8600 ..	7600

There were two lamplighters employed to light and extinguish the lamps. Last year I placed a wet meter to test a dry one at the house of one of my consumers, the result being a difference of 800 feet in a few weeks. My customer did not believe his meter was slow, and sent it to London to be tested, when the meter tester pronounced it slow, and broke the stamps. The meter was then sent to the maker and altered, and was again stamped as correct; but, on testing it in presence of my customer's representative, it gave the following results:—

When passing 2½ feet per hour, 40 per cent. slow.
" " 25 " " 3½ " "
" " 50 " " 2 " "

The meter was a 10-light.

My experience is that dry meters lose a large quantity of gas when working either very slow or very fast, and it is a great mistake to allow (as many managers do) 20 or 30 lights to be put on a 10-light dry meter.

A COUNTRY MANAGER.

Feb. 6, 1875.

BIRMINGHAM WATER SUPPLY.—Dr. Hill, the medical officer of health for Birmingham, in his report for January, says that the "recent sewage contamination" in the water supplied to that town continues very high.

Parliamentary Intelligence.

GAS AND WATER BILLS, 1875.

THURSDAY, FEB. 4.

In the opposed case of the Phœnix Gaslight and Coke Company, the examiner reconsidered his original decision, and sustained some of the allegations of non-compliance with Standing Orders.

HOUSE OF LORDS.

MONDAY, FEB. 8.

The LORD CHANCELLOR acquainted the House that the Clerk of the Parliaments had laid upon the table the certificates from the examiners that the Standing Orders applicable to the following bills had been complied with:—Alford Gas; Ashton-in-Makerfield Local Board; Ashton-under-Lyne, Stalybridge, and Dukinfield (District) Water; Barrow-in-Furness Corporation; Barton, Eccles, Winton, and Monton Local Board of Health; Bath Gas; Birmingham and Staffordshire Gas; Birmingham (Corporation) Gas; Birmingham (Corporation) Water; Birmingham Gas (No. 1); Birmingham Gas (No. 2); Blackburn Water; Bradford Water and Improvement; British Gas Company (Norwich Station); Broadstairs Gas; Broadstairs Water (No. 1); Broadstairs Water (No. 2); Busby Water; Cardiff Improvement; Carmarthen Gas; Cleethorpes Gas; Cleveland (Skelton) Gas; Colchester Gas; Commercial Gas; Eastbourne Water; East Northumberland Water; Galashiels Water; Great Grimsby Gas; Greenock Water; Hamilton Water; Heckmondwike Gas; Hindley Local Board; Imperial Gas; Inverness Water and Gas (Purchase, &c.); Inverness Water and Gas (Works, &c.); Kilmarnock Water; Leicester Water; Longton Gas; Maidenhead Water; Manchester Corporation Water; Market Rasen Water; Marlborough Gas; Metropolis Gas (New Works); Metropolis Gas Undertakings (Purchase); Millom Gas and Water; Neath District Water; Newport (Monmouthshire) Gas; Oldham Corporation Water; Ossett-cum-Gawthorpe Local Board; Oxford Corporation Water; Pemberton Local Board; Peterborough Water; Pontefract Borough Extension; Pontypridd Water; Portishead District Water; Rochdale Improvement; Rotherham Corporation; Slough Water; Southampton Corporation Gas (Purchase, &c.); South Staffordshire Water; Stafford District Water; Stafford Water; Stockton and Middlesbrough Water; Stroud Water; Truro Water; Tunbridge Wells Gas; Wakefield Water; Waterford Improvement; Weardale and Shildon Water; Widnes Local Board; Worksop Water; Worthing Gas.

The Standing Orders applicable to the following bills had not been complied with:—Ballina Improvement; Chelsea Water; Longwood Gas; Phœnix Gaslight and Coke Company.

TUESDAY, FEB. 9.

The following bills were presented and read the first time:—Barrow-in-Furness Corporation; Cardiff Improvement; Greenock Water: Inverness Water and Gas (Purchase, &c.); Inverness Water and Gas (Works, &c.); South Staffordshire Water; Stafford District Water.

THURSDAY, FEB. 11.

Further papers relative to a proposal to substitute gas for oil as an illuminating power in lighthouses were presented.

HOUSE OF COMMONS.

MONDAY, FEB. 8.

Mr. RAIKES reported that, in accordance with Standing Order 88, he had conferred with the Chairman of Committees of the House of Lords, for the purpose of determining in which House of Parliament the respective private bills should be first considered, and they had determined that the bills contained in the following list should originate in the House of Lords:—Barrow-in-Furness Corporation; Cardiff Improvement; Greenock Water; Inverness Water and Gas (Purchase, &c.); Inverness Water and Gas (Works, &c.); South Staffordshire Water; Stafford District Water; Stafford Water.

The petitions for the following bills, and the reports in repect to non-compliance with Standing Orders, were referred to the Select Committee on Standing Orders:—Ballina Improvement; Chelsea Water; Longwood Gas; Phœnix Gaslight and Coke Company.

Copy presented of information furnished with regard to the operation of the respective Improvement and Sanitary Acts of Edinburgh, Glasgow, and Liverpool.

METROPOLIS LOCAL MANAGEMENT ACTS AMENDMENT BILL.—This bill was read the first time, and ordered to be read a second time on Tuesday, March 16.

IMPROVED DWELLINGS FOR THE WORKING CLASSES.

The HOME SECRETARY (Mr. Cross) brought in a bill for facilitating the improvement of the dwellings of the working classes in large towns. He stated that it proceeded entirely on sanitary grounds, and would have strict regard to these two canons—that the State ought not to provide any class of the community with the necessaries of life, nor enable bodies of any kind to supply those necessaries at a lower rate than the market price. To illustrate the dreadful evils of overcrowding, Mr. Cross quoted largely from the death-rate statistics of London, Liverpool, and Manchester, and related at length what had been done to grapple with them in Liverpool, Edinburgh, and Glasgow in the way of demolitions and new buildings. The bill for the present is confined to the metropolis and large towns; it is to be worked by the City Corporation and the Board of Works in London, and by the Town Councils in other towns, and is to be set in motion by the medical officers. When a medical officer reports that a district is unhealthy by reason of overcrowding, the local authority will pass a resolution that an improvement scheme should be prepared. This is to be accompanied by maps, plans, &c. All plans relating to the metropolis will be laid before the Home Secretary, and in other cases before the President of the Local Government Board, who, after due inquiries, will embody them in a Provisional Order, so that the expense of a private bill will be saved. There are provisions for settling the basis of valuation and the mode of arbitration, and the bill provides that when the sites are acquired the local authority shall not build unless after a certain time it is found impossible to induce private speculators to undertake the work.

The bill was read a first time, and the second reading was fixed for the 15th.

TUESDAY, FEB. 9.

The following bills were read the first time:—Heckmondwike Gas; Broadstairs Gas; Broadstairs Water (No. 1); Osset-cum-Gawthorpe Local Board; Busby Water; Hamilton Water; Kilmarnock Water; Maidenhead Water; Barton, Eccles, Winton, and Monton Local Board of Health; Imperial Gas; Newport (Monmouthshire) Gas; Rotherham Corporation; Wakefield Water; Blackburn Water; British Gas Company (Norwich Station); Hindley Local Board; Pemberton Local Board; Widnes Local Board; Pontefract Borough Extension; Birmingham Gas (No. 1); Birmingham Gas (No. 2); Pontypridd Water; Marlborough Gas; Southampton Corporation Gas (Purchase, &c.); Alford Gas; Bath Gas; Colchester Gas; Oldham Corporation Water; Portishead District Water; Stroud Water; Tunbridge Wells Gas; Market Rasen Water; Millom Gas and Water; Birmingham and Staffordshire Gas; Leicester Water; Truro Water; Peterborough Water; Bradford Water and Improvement; Waterford Improvement; Eastbourne Water; Birmingham (Corporation) Water; Birmingham (Corporation) Gas; Ashton-in-Makerfield Local Board; Ashton-under Lyne, Stalybridge, and Dukinfield (District) Water; Cleveland (Skelton) Gas; Longwood Gas; Metropolis Gas (New Works); Metropolis Gas Undertakings (Purchase); Neath District Water; Oxford (Corporation) Water; Rochdale Improvement; Weardale and Shildon Water; Stockton and Middlesbrough Water; Broadstairs Water (No. 2); Commercial Gas; Cleethorpes Gas; Carmarthen Gas.

FIRES IN THE METROPOLIS.

In answer to Mr. FRESHFIELD,

Sir J. HOGG said the attention of the Metropolitan Board of Works has been directed to the question of providing hydrants for assisting in the extinction of fires in the metropolis. The matter is one which requires very careful consideration, and it is now being investigated by one of the board's committees.

LIGHTING, PAVING, AND CLEANSING THE METROPOLIS.

Sir WM. FRASER moved a resolution declaring—"That in the opinion of this House the condition of the metropolis, as regards lighting, paving, and cleansing, calls for legislation." In support of it, he dwelt on the infinite varieties of paving to be met with in the metropolis, and on the wretched supply of gas in the street-lamps, and drew an animated picture of the anomalies of our local government. The vestries, he admitted, did their best, but bad was the best; and, having examined the various schemes of reform suggested, without pronouncing decidedly for any, he spoke strongly in favour of bringing public opinion to bear on the proceedings of all the governing bodies.

Sir J. HOGG defended the vestries, and said that, in his opinion, after having given considerable attention to the paving and cleansing of the metropolis, he thought that on the whole, though there might be some cause of complaint, these things were fairly done, considering that there were 1200 miles of streets to attend to, and an area of 120 square miles. As to lighting, he should not say much. It would be his duty by-and-by to introduce bills asking the House to assist him in regulating or purchasing the gas undertakings of the metropolis, and he should expect the cordial support of his honourable friend in that endeavour. Meanwhile, if the gas companies put bad gas into the public lamps, his honourable friend must not blame the vestries. In justice to the companies, whose gas had to be tested by the Metropolitan Board, he was bound to say that the gas was generally found to be up to the mark when thus tested; but in any case the vestries and district boards were not responsible if the gas were not of the best character. The cost of lighting in one or two parishes would show how considerable this item of local expenditure was. In St. Pancras the lighting cost £15,428; in St. George's, Hanover Square, £11,498; and in St. Marylebone, £17,368; while the paving in Marylebone cost £17,399; in St. George's, Hanover Square, £20,281; and in St. Pancras, £38,947.

Mr. DENISON animadverted on the disgraceful condition of the London streets on Sundays.

Mr. CROSS deferred his remarks on the general subject until the future opportunity which is to occur on Lord Elcho's Bill, but expressed a decided opinion that by the more extended use of scientific appliances for cleansing and paving the metropolis, much saving of expense might be ensured.

The motion was then withdrawn.

WEDNESDAY, FEB. 10.

A petition was deposited against the Market Rasen Water Bill, from Vice-Admiral Tennyson D'Eyncourt.

THURSDAY, FEB. 11.

The following bills were read the first time:—Worthing Gas; Slough Water; East Northumberland Water; Manchester Corporation Water and Improvement; Worksop Water; Galashiels Water.

PUBLIC HEALTH ACTS AMENDMENT.

Mr. SCLATER-BOOTH asked leave to introduce a bill for consolidating and amending the Acts relating to public health in England, and explained at some length the various changes proposed to be made in the sanitary laws. One great object of the bill was to amend and reconcile provisions in previous Acts which were apparently, if not really, in conflict. Since the Provisional Order system came into operation, there had been issued innumerable orders, which, though ostensibly applying to particular cases, had contained proposals of law which had been adopted by the whole community. It was proposed to insert a provision as to the construction of sewers which would enable expense to be avoided in certain cases. It was also intended to provide that local authorities should be empowered to obtain Provisional Orders under the Gas and Water Facilities Act, but this would not involve any question of competition with private companies, nor would it involve any compulsory action beyond what the gas and water bills already contained. The bill also required the provision of mortuaries, to make better provision for dealing with nuisances and overcrowding, and to enable local authorities to proceed against nuisances out of their own districts. Power would be given to the Local Government Board to group districts for the appointment of medical officers, of a less clumsy and difficult nature than at present existed. Some provisions would also be introduced dealing with nuisances arising from smoke and offensive smells, to enable the present law to be more effectually put into operation, and the local authorities would be empowered to take such proceedings as were allowed under the present law whether the nuisance arose within or without their respective districts; and a person who contributed to a nuisance would not be allowed to escape the penalty, upon proceedings being taken against him, by pleading that he was only one of many parties who were guilty of the nuisance. The bill would in no way interfere with the provisions of the law that had been passed in the interest of trades and manufactures, but there would be an amendment so as to make the law reach those smoke nuisances that were exempt from the operation of the present law.

The bill was read a first time, and is to be read a second time on Thursday, Feb. 25.

PROPOSED MUNICIPALITY OF LONDON.

Lord ELCHO brought in his bill for creating a municipality for the whole metropolis, which, he said, had been changed in various particulars since it was circulated in the autumn. A veto is given to the Crown on the appointment of Mayor, Deputy-Mayor, Recorder, and Common Serjeant; the control of the police is to be placed in the hands of the Home Office; the property of the present corporation is not to be distributed over the whole metropolis without the corporation's consent; and the vestries are to send two members to the new municipal body.

The bill was read a first time.

FRIDAY, FEB. 12.

Petitions against the Oldham Corporation Water Bill were presented from (1) James Seville, (2) Charles Shaw.

SATURDAY, FEB. 13.

A petition against the East Northumberland Water Bill was presented from the Corporation of Tynemouth.

GAS SIGNAL-LIGHT AT WESTMINSTER.—The gas signal-light on the Clock Tower of the Houses of Parliament is to be exhibited during the session, in the same position as previously, until Easter, when the existing lantern, which has been much complained of, but which was never intended to be permanent, will be removed, and the light shown at an elevation 30 feet higher. The lantern containing it will be protruded from the tower every night, and withdrawn after the light is extinguished, so that during the day it will be invisible.

Legal Intelligence.

COURT OF CHANCERY.—Friday, Feb. 12.

(*Before Vice-Chancellor* Bacon.)

EUPION GAS SHARES.

PERKINS *v.* JELF-SHARP AND OTHERS.

This was a bill by Mr. Perkins, who is an analytical chemist at Brixton, against Mr. *Jelf-Sharp* and four other late directors of the Eupion Fuel and Gas Company, and six other persons, against whom criminal proceedings have lately been instituted, named *Aspinall Fry, George P. Knocker, Muir, Charles Knocker,* and *Whyte.*

Mr. Kay, Q.C., and Mr. H. Davey appeared for Vickers; Mr. B. B. Rogers for Matthews; and Mr. J. R. Griffith supported the bill.

The plaintiff alleged that he was induced by Muir to apply for 1500 shares in the company, and immediately afterwards to execute transfers of them in blank to Aspinall, believing, from what he considered to be the pecuniary prospects of the company, and the position and respectability of the directors, that he should not incur any risk, and that after so transferring the shares he should be free from all liability. He stated that by the articles the qualification of a director was the holding of shares to the nominal amount of £100, and that the directors had not *bonâ fide* qualified, and had no real interest in the company. He further stated that from the evidence in the criminal prosecution he had learnt that the management of the company had practically fallen into the hands of the last six defendants, and after stating the winding-up order made by Vice-Chancellor Malins, on the 18th of December last, prayed for a declaration that the defendants were jointly and severally liable to indemnify him from any loss which he might thereafter incur by reason of having applied for the shares.

Two of the first-named defendants, Messrs. Vickers and Matthews, demurred.

The Vice-Chancellor said the only question was whether there was any equity stated in the bill. If he were to adopt the statements which had been made, it would seem that the only equity of the plaintiff was that he had fallen into bad company. Then it was said that, in consequence of the winding up, it was "probable" that the plaintiff would be called upon to contribute to the liabilities. Whoever heard of an indemnity being granted upon such an allegation as that? It had been said that the bill was drawn in order to invite a demurrer. If so, his honour could only say that the invitation had been accepted. What Mr. Perkins's future fate might be, his honour must refuse to speculate upon. The demurrer must be allowed, with the usual consequences.

Saturday, Feb. 13.

In re THE STEAM STOKER COMPANY, LIMITED.

This was a petition by a shareholder to wind up the company.

Mr. Jackson, Q.C., and Mr. Brooksbank, who appeared for the petitioner, asked that the petition might stand over, on the ground that the secretary, Mr. Gibson, had filed an affidavit at three o'clock on Friday, which they had not had time to consider; but Mr. Gibson being present, and being tendered for cross-examination, his honour refused the application on its being urged that delay would be ruinous to the company.

Mr. Kay, Q.C., and Mr. Romer, for the company; Mr. Swanston, Q.C., Mr. Cutler, Mr. Eddis, Q.C., and Mr. Lawson, for other shareholders, resisted the prayer of the petition, and took the objection that the petitioner had, as the petition itself stated, not paid all the calls that were due from him. The facts as to this appeared to be that when the first call of £3 was made, the petitioner (who was the holder of 100 shares, on which he paid £1 each, on allotment) at first neglected to pay; but afterwards, on being sued, paid the call. The share capital was £130,000, in 13,000 shares of £10 each, and the object of the company was to work certain English patents for charging and drawing gas-retorts. In the course of this year a second call of £3 was made, which the petitioner had not paid, but by his petition submitted to set apart and secure, or pay, as the court should direct. The petition having been answered on Feb. 2, the petitioner's solicitor on the 3rd offered to pay the amount of the calls, if the directors would undertake not to deal with the money until after the result of the petition was known; and an answer to this letter not having been sent till the 11th, on the 12th the solicitor tendered a cheque on his own bankers for the amount.

After a long discussion,

The Vice-Chancellor said that, though not absolutely bound by, he would follow the rule that was laid down by Lord Justice James, when Vice-Chancellor, in the European Assurance case, and not entertain a winding-up petition by a shareholder who had not paid his calls. The first so-called tender was informal, as being clogged by a condition; and the second was no tender at all. On the ground he had stated, the petition was so defective on the face of it that the respondents need not have gone into evidence. The petition was in fact demurrable, and must be dismissed with costs, except the respondents costs of their own affidavits, which they must pay themselves.

GLOUCESTERSHIRE QUARTER SESSIONS.—Wednesday, Jan. 6.

(*Before Mr.* G. S. Dickinson, *Chairman.*)

CHELTENHAM WATER-WORKS COMPANY, *Appellants, v.* THE OVERSEERS OF CHELTENHAM, CHARLTON KINGS, LECKHAMPTON, AND PRESTBURY, *Respondents.*

This was an appeal by the Cheltenham Water-Works Company against the assessment of their property by the overseers of the above parishes. There were four appeals entered, but they virtually resolved themselves into one. Mr. Sawyer and Mr. Fallon appeared for the appellants, the water-works company; and Mr. Anstie and Mr. Green were for the respondents.

It appears that the rating of the company's works and property in these parishes had not been altered for several years, although the income and profits of the company had largely and regularly increased, and the net rateable value in the several parishes had stood as follows:—

Cheltenham	£1830
Charlton Kings	1221
Leckhampton	110
Prestbury	21
Total	£3182

The overseers having, however, been instructed and authorized to obtain a fresh assessment, engaged Mr. Humphris, the borough surveyor, and Mr. Paul to make a revaluation of the property, and they made the following net assessment:—

Cheltenham	£2687
Charlton Kings	1630
Leckhampton	338
Prestbury	55
Total	£4710

Showing an increase of £1528. The water company appealed against the increase, in the first place, to the Union Assessment Committee, who, adopting the opinion of the valuers, confirmed the increased valuation, but without entering into the details. Thereupon the water-works company gave notice of appeal to the quarter sessions, and the question now came on for hearing.

Mr. Anstie said in a matter of this kind the basis of calculation would depend to a great extent upon the accounts of the company, and an examination would have to be made into their receipts and disbursements. Those materials were in the hands of the company, and his clients had made application to be allowed to inspect their books, so far as it was necessary to determine the value of their property. That application, however, had been refused, and his clients were consequently not so well prepared to go on with the case, as they were obliged to put a conjectural value upon the works of the company. The accounts published by the company were not of so full a character as were required by the Act of Parliament, and as an examination of their books would greatly simplify the matter, and shorten the case, he asked the court to adjourn the case until the Easter sessions, to enable his clients to examine the books of the company in the meantime.

Mr. Sawyer opposed the application, and said the company had complied with the requirements of the Act by publishing each year an abstract of their receipts and expenditure. The parish authorities had had access to the abstract of those accounts, and inasmuch as the matter had been going on for more than a year, and the parish authorities had come to the conclusion that the company was not sufficiently rated by a considerable sum, he imagined they had good grounds for the course they had taken, and it was therefore rather late for them to apply now for an inspection of the books.

Mr. Anstie said the application for the inspection of the books was made some time back, but was refused. He did not pretend to say the court had power to order an inspection, but he thought if an opinion to that effect were expressed by the court the appellants would comply with it.

The Chairman said there was no doubt the accounts of the company would have to be gone into, but he did not think he could order an adjournment, unless the respondents were willing to pay the costs of the day.

Mr. Sawyer said he would consent to an adjournment on those terms.

Mr. Anstie suggested that the costs should stand over, and be made subject to the decision of the appeal.

The Chairman, however, said he could not grant an adjournment, except on the terms he had mentioned; and as Mr. Anstie declined to accede to them, the case was proceeded with.

Mr. Sawyer then opened his case, and pointed out that the rate appealed against, which was made in August last, was assessed upon a rateable value of £4710, and was distributed over the four parishes in the manner indicated above. He would, however, call Mr. Hawksley, who was probably the most experienced gentleman in the world upon such matters, and he thought it would be shown from his evidence that the company had been considerably over-rated.

Mr. *Hawksley* said he was a Past President of the Institution of Civil Engineers, and had been acquainted with the rating of works of this kind for upwards of 50 years. He had been professionally concerned for the Cheltenham Water-Works Company for over 20 years, and for the purposes of this appeal he had gone over the whole of their works in the several parishes, and the result of his calculations was that he estimated the net rateable value at £3729, apportioned over the several parishes as follows:—

Charlton Kings	£1471
Leckhampton	216
Prestbury	143
Cheltenham	1625
Dowdeswell and Tewkesbury (not appealed against)	274
Total	£3729

[As the amount in the last-named parishes was not appealed against, the item of £274 was struck off, making Mr. Hawksley's estimate for the four parishes in question £3455, as against the overseers assessment of £4710.] Mr. Hawksley then entered into an elaborate explanation of the means by which he had arrived at his calculations; the result being that, taking the income of the company in 1873 at £10,530, and deducting all the working expenses and other allowances usual in such cases, he had come to the conclusion that the net rateable value in the parishes of Charlton Kings, Leckhampton, Prestbury, and Cheltenham was £3455, apportioned among the several parishes in the manner above given.

Mr. *M'Landsborough*, engineer and general manager of the company, stated that he had supplied Mr. Hawksley with the figures, upon which his calculations were based, from the books of the company. Those figures were perfectly correct, and he agreed with the results come to by Mr. Hawksley upon them.

The witness was cross-examined at great length by Mr. Anstie, and entered into an exhaustive statement of the property of the company in the various parishes.

The accounts of the company may be thus summarized:—

Gross income for 1873		£10,530
Expenses of management, repairs, and other outgoings	£2632	
Tenant's remuneration, risks, and casualties, interest on tenant's capital, &c.	2459	
Set aside for renewals	848	
Rates and taxes	804	
		6,743
Net estimated annual value		£3,787
Deduct offices, rated at		58
		£3,729

The company apportioned this amount between the parishes as stated above. The capital of the company was stated to be £118,000, of which sum £84,504 had been expended in works of construction.

The evidence of these two witnesses occupied the entire day, and the court then adjourned.

On the case being resumed on Thursday, Mr. Sawyer summed up on behalf of the appellants, and contended that the figures given by Mr. Hawksley were indisputable.

Mr. Anstie, in addressing the court on behalf of the respondents, said Mr. Green and himself had come to the conclusion that, although by calling evidence they might to some extent alter the elements of calculation, it was unnecessary to do so, because, taking them as they had already been given, they found the rate had been confirmed in every particular. The general principle to be applied in the case had been correctly stated by Mr. Hawksley, and he proposed to follow him step by step through his calculations; but he pointed out that the singular result of those calculations was that, whereas his clients had increased the rating of the company one-half, they ought, in point of fact, to have doubled it. The learned counsel then went carefully through the calculations, and, by cutting down the deductions to be made from the income of the company, showed that the net rateable value of the company's property was £5794, although the overseers had assessed it at only £4710. In conclusion, he said the overseers, although kept in the dark up to the last moment, had the sagacity and good fortune, in discharging their duty, to keep within the mark—in fact, they were £1000 below it—and he submitted they had more than established their position, and that the appellants had no ground to stand upon.

The Chairman, after briefly considering the case, said he had come to the decision that £4682 was the fair rateable value of the property of the company, being £28 below the overseers assessment. He had not worked out the principle of allocation, but he accepted the proposal of Mr. Hawksley that it should be distributed over the four parishes in the same proportion as he had distributed his estimate of £3455; but that, as the figures were so very near, there would be a small further allowance to be made in respect of Tewkesbury, if those figures were minutely gone into. The rates would be confirmed, and the costs of the respondents would be allowed.

CITY OF LONDON COURT.—TUESDAY, FEB. 9.
(Before Commissioner KERR.)

HIGHAM *v.* THE EAST LONDON WATER-WORKS COMPANY.

The plaintiff in this action was Mr. J. Higham, of 145, Cannon Street, who sued the company for damages for cutting off the supply of water for building purposes supplied to a house he was having built for him, and also damages for neglecting to supply water afterwards for household purposes. The plaintiff was engaged in having this house built, with many others, at Walthamstow. In November of last year the defendants cut off the water supply to a house in course of building, although he had still many men at work in it. On the 31st of December he paid 5s. for the expense of having the water connected again, and applied to have the water laid on, but the company refused to do it. Since this action had commenced, the company had laid on the water at the very same house. When plaintiff paid the 5s., he received a contract note, in which it was stated that the water would not be laid on unless the fittings were in proper order. The first question to be decided was whether the house could be considered complete, as far as building was concerned, when defendants cut off the water supply.

Mr. *John Oakley*, the local foreman of the company, said that he thoroughly examined the house on the 3rd and 4th of November, and the work was all done, including the plastering.

His HONOUR said he believed this man had acted in good faith, and, therefore, on this point, there would be judgment for the defendants. With regard to the neglecting to lay on a supply to the completed house, the question was whether plaintiff was bound to put in the fittings demanded by the company before he could call on them to put the water in.

Plaintiff said he had referred to the Metropolitan Water Supply Act of 1871, which defined the area of its operations as that given in the Act of 1852. The latter Act did not include Walthamstow.

Mr. HONSLOW, for the defendants, said that they grounded their defence on their own special Act.

His HONOUR said they had nothing to do with one Act or with the other. Here was a special condition in the contract note in which the company reserved power not to supply the water if the fittings were not to their satisfaction. The action ought to have been brought for damages in not carrying out this contract. How could the plaintiff show that the fittings were in proper condition?

Plaintiff said they were the same as he had put in 30 houses before on the same estate.

The defendant's foreman, on the other hand, said that the last house in which they laid water on for Mr. Higham had a "waste-preventer," and the same apparatus was supplied to this house before they would lay the water on. Mr. Higham had previously refused to put it in.

Mr. HONSLOW here said that there was a clause in the company's special Act —the 69th clause—which enacted that the apparatus at all houses should be constructed so as to effectually prevent waste.

Plaintiff said he had only now put in the waste-preventer "under protest," and had no intention of being bound by his conduct.

His HONOUR said he had nothing to do with acting under protest. The question was, had the company kept to their contract? It might be that companies were exceedingly tyrannical—perhaps they were—but he could not take any notice of that. So long as they kept within their Act of Parliament his simple business was to administer that Act. If plaintiff said that some of these Acts about companies ought to be repealed, probably he agreed with him, but that was a matter for the Legislature.

Judgment for defendants.

Miscellaneous News.

NEW PROCESSES IN PROXIMATE GAS ANALYSIS.

By HENRY WURTZ, of New York.

[Communicated in part, with Experimental Illustrations, to the "American Gaslight Association," Oct. 22, 1874, and forwarded to this JOURNAL with emendations by the Author.]

Gas analysis, in the widest and highest sense of the expression—comprehending the proximate analysis of gaseous mixtures, natural and artificial, as well as the ultimate analysis of gaseous compounds—includes what have heretofore been unquestionably the most difficult and delicate, while also, when correctly viewed, the most fruitful and promising branches of laboratory chemistry. It is also quite just to assert of these branches that they have of late years been far too little cultivated by many chemists of the first rank. It is to this that I would attribute the fact that your own great and noble art of artificial illumination—to which I might add those of metallurgy and furnace operations generally—linger in a stage of empiricism not in accordance with the actual advancement of chemical science. It may safely be alleged that we are now learning far more, and more rapidly, of the liquid and solid products of retorts, stills, and furnaces, than of the gaseous products. This should not continue; and I venture to hope that the observations I have to offer may, in some measure, lead the way, and, to some extent, lay the foundation, for the more diligent application of known chemical principles to the practical investigation of gaseous mixtures and products of the chemical arts.

The class of methods known by the rather insignificant name of eudiometry, had so great an impulse imparted to it a quarter of a century ago by the genius of the illustrious Bunsen, that gas chemists have really seemed to me to merit since, in some measure, the reproaches cast upon the immediate disciples of Aristotle of old, who believed their great master had probed the depths of possible human wisdom, and therefore refused to interrogate Nature further. It is true that many of Bunsen's methods, apparatus, and manipulations in gas analysis will remain indispensable, and will stand as monuments to his fame, very little having been done since, except in the way of modification, by other chemists; but there are, nevertheless, cases and conditions, often of great importance, where all so-called eudiometric methods fail to satisfy the practical requirements.

One such case may here be entered into as an example. This is the determination of *air* as a contamination of illuminating gas. It is well understood that each single proportion per 100 of air destroys at least 6 per cent. of the illuminating value of an ordinary coal gas. It is not easy, then, to exaggerate the importance of this case. But, in a eudiometer 500 millimètres long, one volume per 100 of air is but one millimètre of oxygen. A variation or error of observation of a single degree Fahr. of temperature, or of ·061 inch of barometer, down or up, will either double or destroy this determination. But by the methods I have now to propose 1 cubic foot of such gas will yield, in a form amenable to the balance, 1·18 grain = ·076 gram of oxygen; and 5 cubic feet, ·3815 gram.

Moreover, in eudiometric oxymetry, the introduction of potassic pyrogallol into the gas under investigation is always of necessity preceded by that of potassic liquor or potassic hydrate, to remove carbonic acid; and if this potash be washed out with water, say with a minimum of 20 millimètres (in a eudiometer of 500 mm.) of the latter, this water will always abstract some of the oxygen sought to be determined. At 60° Fahr., = 16° C., 20 mm. HO can take up (Bunsen) ·59 mm. of O; or, in this way, as much as 59 per cent. of the oxygen (and air) sought may be altogether lost! I may add that, in working on coal gas, the further possible, or at least supposable absorption, by this 20 mm. HO, of ·29 mm. of N, ·39 mm. of H, and ·48 mm. of CO gases, together with the ·59 mm. of O—1·75 mm. in all—might vitiate the CO_2 determination to the extent of ·35 per cent. of the whole volume in excess; which, in a coal gas purified by lime, would be a vitiation quite fatal to the value of the analysis.

Some eudiometrists may reply that they do not wash out the potash with water before applying pyrogallol. If so, I must impugn their work on several other grounds; for instance, will the film of potash liquor on the inner walls of the eudiometer occupy the same volume as a film of pure water? My own experiments have shown me that it will not. Again, either solid potash or strong potash liquor desiccates the gas, thus introducing another very appreciable error. A conscientious original investigator, who tests all methods rigidly himself, will devise ways to mitigate, if not to eliminate, some of these difficulties; but this does not meet the practical requirements of the case, for all are not competent to do this.

The above is cited as but one sample of the multitude of difficulties with which every really competent eudiometrist must admit himself to be environed.* Special and complex devices have not been wanting, many of them of great and permanent value, to lessen certain difficulties; but it has appeared to me that in those cases, including many of the most important ones—as, for example, illuminating gases, and gaseous furnace products, in which the mixture to be analyzed is attainable in volumes practically illimitable—it would be well to try to cut loose from methods which are purely volumetric, and to devise such new ones as would enable us to deal with quantities that can yield ponderable products; thus appealing direct to that infallible criterion, the chemist's "court of last resort," the balance.

In this attempt, I have already met with success sufficient to encourage me to put forth the results before the chemical world, confident that some things will be recognized in them worthy, at least, of being followed up and brought to a further stage of perfection. This further pursuit of these paths of promise will be my own task, so far as it may be permitted to me.

The methods I now put forth are founded on the general principle of submitting a slow current of the gas to be investigated to the action of a series of agents, so selected and combined as to absorb and separate, in succession, each by itself, the different proximate constituents of a gaseous mixture, converting each into a solid or a liquid form, which can be weighed on a balance. About 1840, European chemists were using successfully methods of this class. One method, which arose at that time out of their experiments in this direction, was that still in use in "Organic Analysis," for separating, in distinct and weighable forms, water and carbonic acid. Strangely, however, the capabilities of these methods seem to have been looked upon as very narrow and special, and they have passed almost out of view. At the present day it is probable that a majority of chemists would not have anticipated, in advance, much satisfactory success in the application of these modes of procedure to such complex mixtures as crude coal gas or a furnace gas. My experience has, nevertheless, tended to an opposite conclusion, and I believe that I discern, in this direction, the only practicable road to complete success in the proximate analysis of heterogeneous gases.

[In this memoir, I will here say, I must confine myself mainly to illuminating gases. The handling by these methods of furnace products will furnish subjects for future communications.]

In a crude coal gas, as drawn from the hydraulic main over the retort benches, the following main constituents may be enumerated, which it is highly important that a gas chemist should be competent to separate and determine with precision:—

1. Tar, suspended in the form of spray.
2. Water, in similar mechanical admixture.
3. Water, as vapour, dissolved in the gas.
4. Naphthaline (condensable).
5. Other condensable hydrocarbons.
6. Smoke and soot (with dust).
7. Ammonia.
8. Carbonic acid.
9. Sulphuretted hydrogen.
10. Carbonic oxide.
11. Oxygen—that is, intermixed air.

Of these 11 proximate constituents, I have so far succeeded in separating, with very satisfactory sharpness, Nos. 1, 2, 3, 6, 7, 8, 9, and 11—eight in all—besides some approximation to No. 4, the naphthaline in excess. Nos. 5 and 10 are still subjects of experiment.

My success, so far, is to be attributed mainly to the gradual attainment and combination, by tentative experiment, of the following devices and manipulations:—

First, arresting suspended matter by means of empty dry flasks, and straining through cotton previously desiccated.

Absorbing next the ammonia, by means of reagents which act on no other ingredient.

Next, drying the gas with CaCl, which, NH_3 being absent, may now be done.

Next, taking up the sulphuretted hydrogen by a normal metallic salt, so selected or so managed as to give up no water or acid vapour to the desiccated gas.

Next, using sodic hydrate to absorb the CO_2, with certain precautions described below.

Next, alkalized pyrogallol, or other suitable agent, to absorb oxygen, arranged so as to lose no water.

In the case of illuminating gases, with some few others, the final (rough) measurement of the gas is then made at an observed temperature by a gasmeter—if with a dry meter, directly; if with a wet meter, after saturation with moisture at the temperature of melting ice.

In the latter case—of a wet meter—the amount of final moisture in the gas is determined by a reiterated desiccation with CaCl.

The whole process is finally completed, and the separations rendered as sharp as may be, by a process of distillation, either at the ordinary or higher temperature in a current of the same gas analyzed, that has been previously subjected to the same or similar treatment, and thus freed from all the ingredients to be separated from each other.

After final weighings, the correct initial volume of the gaseous mixture is calculated by certain formulæ derived, as specified below, from the crude meter indications and the final weighings.

I shall now proceed to an attempt to explain (simultaneously, to save space), the details of the methods as applied to each constituent, and those of the construction, preparation, and arrangement of the different pieces of apparatus, as connected, and represented in the figures.

I.—ANALYSIS OF CRUDE GAS, IN THE GAS-HOUSE, BEFORE PURIFICATION.

The mechanically suspended Tar and Water.—The joint devices for arresting these two substances, in the first instance, are shown in fig. 1, letters A to F inclusive. A indicates an inch-thick soft rubber cork, with two perforations, occupied respectively by a thermometer, and an eduction-tube bent at a right angle, inserted into an aperture bored through the wall of the hydraulic main or of any other main in the works. This eduction-tube must at once descend, to allow liquids to flow into the flask, and must have a stop-cock in it.

* I may be excused for here introducing the remark that I myself have endeavoured to do my share, with other gas chemists, towards the emendation of Bunsen's system of eudiometry. My own efforts have been generally in the direction of simplification, acceleration, and more especially to attain (what I have always deemed) the great desideratum of a reduction of the needful amount of quicksilver to a minimum. I now use simple devices and manipulations, which enable me to accomplish all the essential work of eudiometry with, at the most, 10 lbs., and chiefly with not more than 5 lbs. of the liquid metal. These will soon be submitted to the chemical world.—H. W.

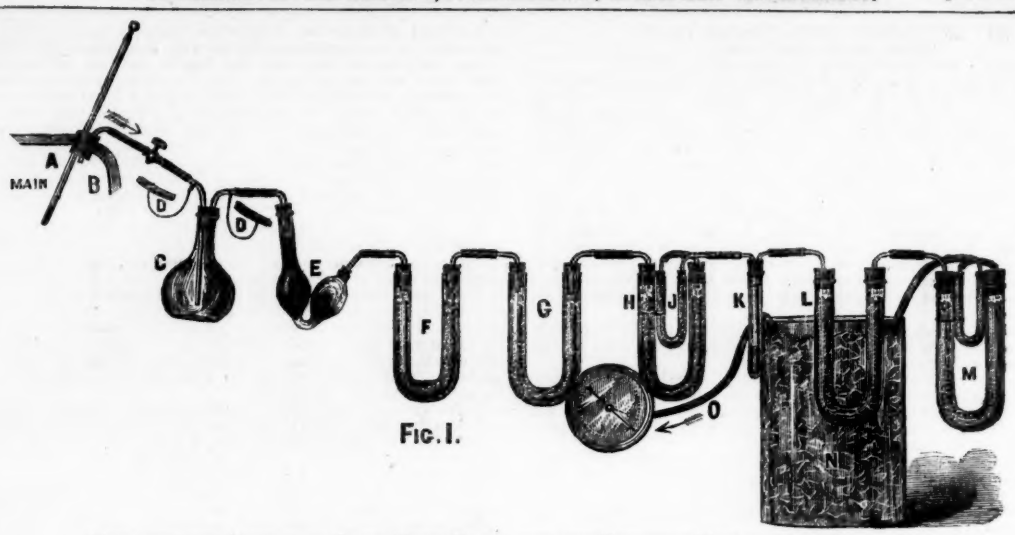


FIG. I.

TRAIN FOR THE ANALYSIS OF CRUDE MIXED GASES: FROM THE HYDRAULIC MAIN OF A GAS-WORKS, ETC.

[*Note*—Between G and H an additional tube, precisely similar to G, charged with *chloride of calcium*, is employed, which, for simplification, has been omitted from the figure.]

The first member of the train is an empty dry thin glass flask, C, which collects almost the whole of the spray, aqueous and tarry. DD are two stoppers for closing C hermetically, constructed of pieces of rubber tube closed at one end by short sections of glass rod. The bent wires by which these are permanently attached to the flask had better be of iron than of copper, as they are to be weighed with the flask, and the latter metal is quickly blackened, and may be slightly changed in weight by the sulphide of ammonium that pervades the atmosphere of the gas-house. In a permanent apparatus, for nicety, platinum wires had better be used. Copper wires, however, used here, and in other parts of the apparatus, may be protected pretty well by coating with collodion, or even with a film of paraffin. [All the brass stop-cocks I use in these and all other operations with sulphuretted gases, I prefer to plate, inside and out, with nickel, which protects them perfectly against sulphur. This nickel-plating every gas chemist will find it well worth his while to perform for himself, as it is very easy to accomplish, in case of brass and copper surfaces, with slight practice. I propose publishing a note which I think will lead any laboratory worker to success in his first trials.]

These trains of apparatus are probably most conveniently set up by being suspended to a strong wire—best of soft copper—stretched tightly between two convenient points of attachment. To make this wire tense, or "taut," it had better be in two pieces, attached first at the extremities, then twisted together strongly and warily with pincers at the point of meeting. The tubes are hung on inverted V-shaped (A) wires bent into hooks below. These, for simplicity, are not figured. All the rubber tubing used as connectors I wash laboriously, internally and externally, in a rapid current of water, with hard rubbing between the hands, until absolutely clean, then rub dry, and lubricate, within and without, with thick syrupy glycerine. The excess of this being wiped off, the tubing is found permanently more flexible, far less liable to abrasion of surface, more easily slipped over ends of glass tubing, and, above all, has its capacity for absorbing certain constituents of the gas reduced to a minimum. All the corks should be rubber, scoured and glycerated superficially in the same way. The cork at A—owing to the heat and actual contact with tar—and, to a less extent, the cork of flask C, are somewhat penetrated and softened, so that A gives out after being used a number of times. The others last indefinitely.*

E and F are stuffed uniformly, but as loosely as practicable, with cotton, which is best inserted and gently packed down, in successive small wads, picked out before insertion. The bulbous pattern, like E,† may present here some advantage, but it is not at all essential. Its use, as photographed in this case, was in order to bring down somewhat the level of the rest of the train. I have used and prefer a compound cotton apparatus, or two tubes of the size of F, united by a twisted wire in the manner of A in fig. 4. These can be weighed together conveniently.

Even in case of a gas that has passed through condensers and scrubbers, it seems necessary to use two tubes of cotton. In one actual series of analyses, of unpurified coal gas before and after having passed the scrubbers and condensers, the second tube, F, increased, on an average, in weight (all moisture having been removed) from the uncondensed gas, ·128 grain, and from the condensed, ·072 grain, per cubic foot of gas passed, up to 7 cubic feet. The main consideration here is the initial pressure at command of the gas. If the customary exhauster is employed in the gas-works, and kept at work during the analyses, the pressure between the exhauster and the retorts may be found so low that a train attached between these, may not admit of more than one cotton tube, and even this packed as loosely as possible. At points beyond the exhauster, however, this trouble seldom occurs; it having been necessary, indeed, in some such cases, with unpurified gas, to partially close the cock in the eduction-tube, to bring down the rate of flow through the train to about 1 cubic foot per hour, which it should not in most cases exceed.

The Ammonia.—In order that we may employ, for dehydration, the highly convenient, powerful, and reliable agent, chloride of calcium, it quickly became apparent to me, in my earliest experiments, that the ammonia must first be abstracted from the gas; and my first efforts were to decide upon the proper agents that could be used, in solid form, for this absorption. One of these I have so far sufficiently tested, by quantitative as well as qualitative experiments, to demonstrate its entire applicability to this use—namely, fused potassic bisulphate. It is proper for me here to state that the earliest preliminary experiments with the bisulphate were made, at my suggestion, in the course of an investigation carried on jointly by Professor B. Silliman,‡ Dr. S. D. Hayes, and myself, in which we desired to absorb the ammonia of crude coal gas. We all became convinced, I believe, that potassic bisulphate had the power to take out qualitatively the NH_3 from gas; but the precautions essential to success, in a quantitative way, have been since worked out by myself alone.

The mode of preparation of the bisulphate is by simply cracking in a mortar to the average size of wheat grains, and removing the dust and finer particles by a sieve of eight holes to the inch. The dust is very painfully irritating and injurious, and its inhalation must be avoided, if possible.

[Though many chemists seem, somehow, to have acquired the idea that bisulphate of potash possesses more or less deliquescence, it in reality has none of this quality whatever, and it is not even hygroscopic, to any remarkable extent.]

It must not be supposed that the bisulphate takes up ammonia as NH_3, which would involve a very important error. The compound formed, as desiccated for the final weighing, is the double sulphate of potash and oxide of ammonium. The factor *am* in the equations below must be obtained, from the increase of weight, by multiplying by a coefficient = ·70833. And it may here be remarked that a part of another factor *ww* comes likewise from this increase of weight, through multiplying it by ·29267. This ammonia-tube is lettered G.

The Water.—Chloride of calcium for absorbing this comes next in our fig. 1 train, though, as it would be merely a duplicate of G, the CaCl tube has been omitted from the cut. I prefer—after trying many preparations—a fused chloride, assuring myself, above all, that it is free from every trace of causticity, and crack it up to the size of small peas, sifting out all that passes a sieve of six holes to the inch. For the small CaCl tube J, the one in M (fig. 1), and J and L in fig. 4, I find it desirable to crack but little, if any, smaller, to avoid risk of obstruction.

The Sulphuretted Hydrogen.—For this constituent I have tried several absorbents, but none as yet that answers, on the whole, so well as common crystallized blue vitriol, cracked and sieved to wheat-grain size. As in desiccated air, it slowly loses some of its water (Graham found that in fine powder, over oil of vitriol, it lost in seven days three of its five water equivalents), I add a small CaCl tube, which is, of course, weighed with it in all cases. The test-tube K, containing a slip of lead paper, belongs (qualitatively) to the cupric-sulphate tube H.

With crude gas from highly sulphurous coals, it may sometimes be prudent to duplicate this member of the train. Of course the small CaCl tube J need be added only to the second one. The increase of weight in this member is, of course, HS. If to be calculated as simple sulphur, as sometimes required, it must be multiplied by ·9471.

The Carbonic Acid.—The agent which combines, for this absorption, the greatest advantages by far, is that form of sodic hydrate now so common in commerce, cast into pencils, and labelled "soda by lime." In this class of operations the weight of CO_2 to be absorbed is often very large. In 10 cubic feet of crude coal gas, containing 2 per cent. by volume of CO_2, there is about 172 grains by weight of the latter, which requires for absorption (if normal carbonate be formed) near 315 grains of sodic hydrate. Although some bicarbonate is usually formed, yet the absorbing surface required is large. Potassic hydrate, prescribed in the books, is wholly out of the question for these methods. The solubility of KO,CO_2 is so great, especially as much heat is always developed during the CO_2 absorption, that the water of the hydrate serves to melt the mass into a magma, and quickly to obstruct the flow. In cases where mere abstraction of CO_2, without weighing, is the object, one large tube, containing 10 or 12 ounces of sodic hydrate—as in H, figs. 2 and 3—may be employed; but, in the case under consideration, two tubes must be used, containing each 5 or 6 ounces, to reduce within conveniently weighable limits. These are here lettered L and M.

The soda-pencils are cracked up, a few at a time, by gentle blows in a mortar, to lengths of from ·5 to ·7 inch. This is very rapidly and easily effected; but still a film of moisture is absorbed; and I have found that desiccated gas will then take up from it a trace of water. The precaution is therefore taken to append a small CaCl tube to the second of the two, M. This may be avoided if the preparatory train, fig. 2, be employed to dry out these soda-tubes, before their initial weighing.

The Meter and the Measurement thereby.—This most essential operation of all is effected with every precaution to ensure known conditions of the residual gas. In the case represented in fig. 1, it is to be understood that a dry meter is used to measure the gas as absolutely freed from moisture, and at, or as close as possible to, the temperature of melting ice. Within N, filled with cracked ice, is coiled some feet of rubber tubing, well glycerated internally, and the meter is enclosed—leaving the dial exposed—in an outer casing, not here shown, filled with feathers, or better with ice. In an emergency, muffling the meter in blankets has been resorted to.

The meters used must, of course, be most carefully tested, and their average errors determined and taken note of. Space cannot, unfortunately, be here spared to explain the modes of effecting this. As it may often be necessary to use wet meters, like those usually found in photometric rooms, I have represented in fig. 4 a modified mode of measurement, which admits of such use. Here also the whole meter, except the dial, ought to be protected, as before, from external warmth.

It will be readily understood that when the photometric meter—which usually registers but 4 feet in one revolution—must be employed, appropriate measures must be taken to mark, or verify in some sure way, the number of

* All these corks should be of the *best* quality made. Many in the American market are very poor—indeed, useless for this kind of work. I procure mine from John N. Elmore (the successor of Quettier), at 193, Greenwich Street, New York, who will also supply, or have made, the different sizes and patterns of U-tubes, &c.

† I may say here that E, as shown in the cuts, was in the condition left after having been used, and, in drawing from the photograph, an attempt has been made, none too successfully, to reproduce the shading of the arrested soot.

‡ Professor Silliman has also since worked by himself on this or a closely related subject, and made a communication to the National Academy, at the late Philadelphia meeting, to which I would refer. Prof. Silliman, I believe, experimented chiefly on the utilization of crude commercial bisulphates, generally of soda, called "salt-cake" in commerce, for the technical extraction of ammonia from gas.

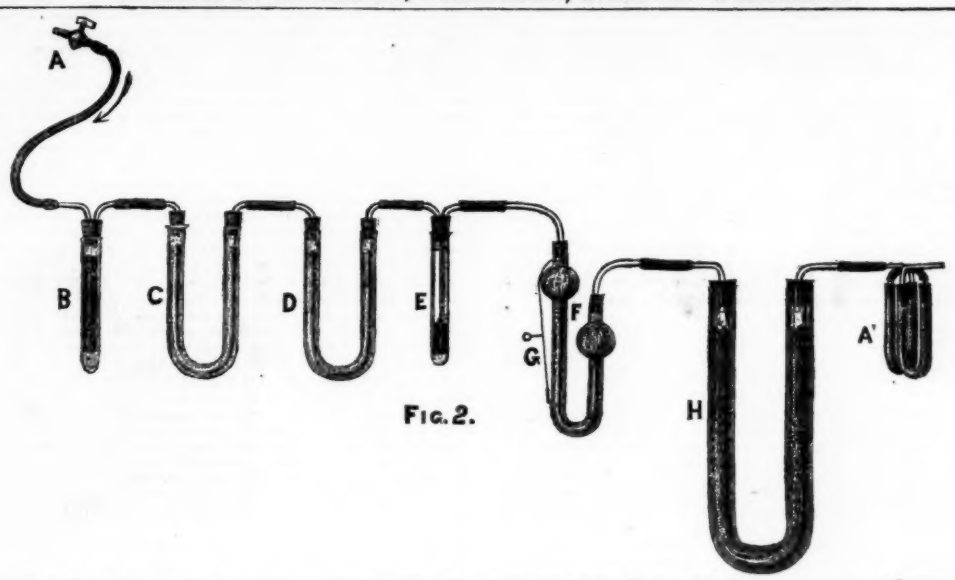


FIG. 2.

SUPPLEMENTARY OR PREPARATORY TRAIN; BOTH FOR PRELIMINARY PREPARATION OF THE TRAINS FOR ANALYSIS, AND FOR COMPLETION OF THE PROCESSES THEREIN.

revolutions, when these are desired, or are likely, to exceed two revolutions in all. In fig. 1, as I ought here further to explain, the eduction-tube, O, which is the prolongation of the coil in N, passes to the inlet aperture of a dry meter, and not, as in fig. 4, to the rear of a wet-meter drum.

II.—OF THE PREPARATORY TRAIN (FIG. 2).

This is employed in the initial drying-out of the apparatus, preparatory to the first weighings, and also for the final completing of the separation preparatory to the last weighings; in the latter case, by the distilling or transferring over, in a current of pure dry gas, of the liquids that condense, by mere refrigeration and adhesion, in the first tubes.

It is made up as follows:—Stop-cock, A, in an induction-tube from any service-pipe bringing street gas; test-tube, B, with inlet-tube passing to its bottom, which contains a strip of turmeric paper, to indicate (qualitatively) ammonia; two U-tubes, C and D, containing respectively granulated fused bisulphate of potash, and granulated blue vitriol; a second tube, E, containing slips of both turmeric and lead paper, to demonstrate the complete removal by D and E of the HS and NH_3 (the latter by comparison with the turmeric paper in B) a CaCl tube, F; and a sodic hydrate tube, H (of large dimensions, as shown, in cases where the street gas, through iron purification or otherwise, contains very much CO_2). [B, in this train, is not at all essential.]

In this figure the preparatory train is represented as attached to the first compound member (marked here, A') of the train for analysis of purified gas, shown in fig. 4. In fig. 3, H represents the final member of the preparatory train; showing its connexion with the train in fig. 1, during the distillation preparatory to the final weighings.

It may be stated that this preparatory train being required only to furnish a current of gas free from moisture and impurities, it is obvious that the current that issues from one analytical train while in operation is suitable for the preparation, for either initial or final weighings, of another analytical train, and that this circumstance will at times be available, and lead to saving of trouble in transportation and erection of apparatus.

Another important point of practice with the preparatory train demands a few words. Its union with the analytical train, represented in fig. 1, makes a long and very tortuous passage for the gas, which necessitates an important pressure to force a rate of flow sufficient for rapid work. This is very liable to cause difficulty with street gas, particularly during the midday hours. It will, therefore, often be advisable to arrange so as to conduct preparatory operations during the night hours. Cases occur in which special expedients may be necessary, to procure a sufficient flow. A small gasholder, when available, may be used. The pressure in the mains between the exhauster and the purifiers, will always be ample to force one or even two cubic feet per hour through almost any length of (unobstructed) train; but in this case it must be remembered that the preparatory train should possess an extra size and power, and be properly proportioned, to take out the large proportions of impurities present; for if a preparatory train, left working with an analytical train overnight should become fouled, of course, the whole apparatus would be liable to be rendered useless, and the whole time and labour be lost.

It may be scarcely necessary to suggest that for these preparatory operations coal gas is used only for convenience. With a holder or an aspirator a stream of air, similarly freed from HO, NH_3, CO_2, &c., is generally equally applicable, and when the pressure has to be assisted, we may, in most cases, just as well use air if we have the appliances.

III.—OF THE GENERAL MANIPULATIONS WITH CRUDE COAL GAS.

In addition to the details which have been given when describing singly the members of the train in fig. 1, further explanations are needed, especially with regard to the application of the preparatory train thereto. In the preliminary preparation for the *initial* weighings, it is unnecessary, with the arrangement as here represented, to attach more than the first four pieces to, and including the bisulphate tube, G, for reasons which will be obvious without explanation. Some five or six cubic feet of gas transmitted from a preparatory train, will dry out these first four members sufficiently to allow of correct weighing. This will be accomplished by setting and keeping the apparatus at work during one night, say from five p.m. till eight a.m., or 15 hours, at the rate of about ·3 or ·4 feet per hour. The rate of flow is readily regulated by a few observations, of ten minutes each, of a meter at the tail of any train. A little practice enables the rate to be judged of closely enough, by the size of the flame burning from a small straight glass tube at the tail of the apparatus, as shown in fig. 4.

The preparation for the final weighings is here the important part, and indeed the only troublesome part, of this analysis. Fig. 3 represents, as aforesaid, the mode of attaching the preparatory train to fig. 1 for this final operation, or rather succession of operations. D here represents a new tube introduced at this time, which is an ordinary form of CaCl tube, but having its smaller extremity bent at an obtuse angle, as shown, and which contains near its upper end a slip of turmeric paper, and has, moreover, running through it from end to end, and projecting an inch at each end, a *small flexible copper wire*, the object of which is to clear a passage through the crystals of naphthaline which condense in this tube at a subsequent stage of operations.*

After the disposition of the apparatus has been made—D having been, of course, weighed with its appendages, and the jar of ice, N (which is no longer of use) removed, the meter being connected directly with M—the first step is to distil over, at a very low temperature (unless saving time is important, at ordinary temperature) in the current of gas from the preparatory train—which generally, in this case, may flow even as rapidly as 2 feet per hour—all the volatile ammonic carbonate and sulphohydrate that has condensed in the flask, C, and cotton tubes, E and F. The volume of gas required to effect this may be double (or even more) that from which the liquid was condensed. It ought to have been stated that the total amount of crude gas analyzed by this apparatus should not exceed 10 cubic feet. This volume is within the limits of manageability, but generally somewhat less is probably advisable. With a rapid current of gas, this complete transfer of the volatile ammonia compounds will be found to have been effected during 15 or 18 hours; but sometimes more time is required, and it is better to allow 24 hours for this part of the process. If an attempt to hasten it is made, by immersion of the flask in warm water, constant watching is necessary, as naphthaline then enters upon the scene, and may at once clog up all passage. The complete transfer of the ammonia is indicated by the return of the slip of turmeric paper to its natural colour. As, in my experience so far, this liquid always contains chloride of ammonium, and possibly sulphite and other non-volatile ammonia salts, those who wish to transfer all the ammonia to the bisulphate tube, F, must introduce into the flask a weighed quantity of dry hydrate of soda.

When the ammonia transfer has been completed, the flask, C, is immersed—the gas current being continued—in water sufficiently hot to volatilize the naphthaline, which will condense in crystalline form, together with water, in the tube, D. The wire running through D now comes into play; and, in fact, without it naphthaline would here become as great a cause of difficulty as it often does in the distribution of coal gas. When clogging occurs, the gas current is stopped, the rubber connector between D and E detached, and the wire moved up and down or twisted round. With careful management, two hours work and some 2 feet of gas from the preparatory train, will suffice to transfer the naphthaline to D, which is then detached and weighed again. To remove the intermixed water from the naphthaline, the lower end of D is stopped, the cork and tube removed from the upper end, the wire coiled within, and this upper end connected by a wide short rubber connector with the open end of a test-tube containing some granulated CaCl. When dry, the cork and

* This wire should have been shown more distinctly in the cut, but this is only one of several unfortunate defects in these cuts.

FIG. 3.

SUPPLEMENTARY ARRANGEMENT FOR COMPLETION OF PROCESS IN THE TRAIN SHOWN BY FIG. 1.

tube restored, the stopper removed, and the weight again ascertained, the variation now from the first weight is the naphthaline, so far as it can be saved by this mode, which, of course, is imperfect, but is the best that I have so far succeeded in devising.*

The flask, C, still containing tar and water, is then removed likewise from the arrangement, the stoppers, D D (fig. 1), being applied, and then H of the preparatory train is connected directly with the first cotton tube, E, the gas flow being resumed. Some 5 feet more of dry gas may now be required to transfer all the moisture to the CaCl tube between G and H (omitted from the cut). The water and tar in the flask, C, must be separated by careful distillation at a very moderate temperature, and, in estimating the weight of the residual tar, account must be taken of the sodic hydrate that was added, as above, to eliminate the fixed ammonia.

The point at which the whole train becomes dry and ready for the final weighings is readily perceived by a practised eye. One indication is a faint superficial whitening of some unaltered blue granules (if any) of cupric sulphate in the tube, HJ. Several other indications might also be cited.

(*To be continued.*)

METROPOLIS GAS SUPPLY.

Court of Common Council.

A Meeting of the Court was held on Thursday last, Feb. 11—the Right Hon. the Lord Mayor (Alderman Stone) presiding.

Deputy Fry moved the following resolution—"That this court, being desirous of expressing its opinion upon the Metropolis Undertakings Purchase Bill prior to the Gas and Water Committee taking any further action in prosecuting the same in Parliament, instructs the committee to report thereon forthwith, furnishing such information and particulars as may be deemed necessary to assist in forming a judgment upon its several provisions." In doing so, he said: My Lord Mayor, I wish it to be first of all clearly understood that, in submitting this resolution for the consideration of the court, I do it in no hostile spirit. In fact, I ought to be preserved from any such imputation, from the fact that when members of both sides of the court were complaining as to the existing state of the gas supply, it was I who suggested whether the time had not arrived for the court to take some action for remedying the evil by applying to Parliament for power to manufacture gas ourselves. Upon that it was referred to the Gas Committee, and the result was that they, in conjunction with the Metropolitan Board of Works, have agreed to a bill which has been deposited in Parliament, and a copy sent to every member of this court. I wish also to state that I am quite aware of the terms of the reference which was made to the Gas Committee. They were wide, extensive, and general, and I am not here to find fault, or to say that the committee have gone beyond the limits of their powers. But, my Lord Mayor, I make this observation that, one would have thought that in a matter of so much importance, involving issues so serious, and an expenditure of money so very considerable, the Gas Committee would be only too anxious to take the court into its council and confidence, with a view that we should share the responsibility of any steps which may be taken therein. But instead of that, the Gas Committee have advisedly committed this corporation to the provisions of this bill, not only without giving us the opportunity of expressing our opinion upon it, but positively without giving us the opportunity of knowing what the provisions of the bill are. Now, let me say here that a committee, however important, and however gifted its members may be, is not the Corporation of London —(hear, hear)—and I am here to say that, whatever may be the terms of the reference to them, and however general they may be, I think, on a question of this kind, it is highly important that we should be parties to a proposition so momentous, and involving consequences so serious as this. And therefore it is that I bring forward the motion that I have put on the paper of business, my object being to ask the court that, before they give their sanction to the provisions of the bill now in Parliament, we may have all the facts and the figures before us that are necessary, in order to form something like an intelligent judgment with regard to the matter. (Hear, hear.) I now come to the main question, and I refer the court first of all to the clause in the bill which provides for the purchase of the undertakings of the existing gas companies. Clause 7 of the bill provides that the Metropolitan Board of Works shall purchase those undertakings—*i.e.*, of the 13 companies—for a sum equal in amount to the value of the share capitals of those companies, according to the market value, estimated on the average price during the three years next preceding Oct. 1, 1874. Now, I was much surprised when I read this in the bill, because, when I ventured to suggest, at a previous court, that the Gas Committee was in some way committing us to the terms of purchase, I distinctly understood from the chairman that nothing was settled, and that nothing was arranged. It was stated that nothing had been agreed to, and that Parliament was to do the whole business; that this was a kind of skeleton bill, and that Parliament was to clothe and give it life. Whereas, I ask any honourable member taking this bill in his hands, and reading it, whether the Gas Committee have not committed this corporation, in conjunction with the Metropolitan Board, to this, that if the gas companies are purchased, they are to be purchased at the price here named? (Hear, hear.) Now, I am perfectly well aware that a bill is not an Act of Parliament, and that it will not become an Act until it has passed its final stage, and received the Queen's assent. But I will ask any member—the chairman of the Gas Committee himself—whether he supposes the gas companies or Parliament are likely to say, "Gentlemen, you have made a great mistake; you have offered considerably more than these shares are worth, and we beg you will offer considerably less." Does any one dream of that? Then I say that by the provisions of this bill the minimum price of the shares is definitively fixed, and if Parliament passes the bill, it does so on the distinct understanding that this is the price to be given. I am extremely curious to know the facts and the figures, and the calculations that have been made, and which are the warrant to the committee in fixing this price. I venture to give currency to a rumour that was floating about some two or three weeks ago, that the Gas Committee, as a body, knew nothing of this business, that it was delegated to a few —some six or eight—members; and it is very extraordinary that two gentlemen who were put on that committee, were put on for the special purpose because of their profound knowledge of the water question. Well, I am happy to know that this rumour is not true, and that the Gas Committee do know everything about it, and therefore I assume that every member of that committee has had before him the balance-sheets of all the companies here mentioned, for the last three years specified in the clause. I assume that they know exactly how much capital each company possess, how much of it is in shares, how much in loans, how much on debentures, how much on mortgage account. I assume also that they know for what purpose it was raised, and how it has been applied, and I now, therefore, ask that all the members of this court may have these facts and these figures presented to them, that we also may know how they have arrived at their conclusion, that the present price of gas shares is the price which the corporation should pay, supposing these undertakings are purchased. Now, in the absence of this information, there are a few things that strike me as very remarkable. The first is, that during the three years mentioned in the bill, gas shares were higher in price than they had ever been before. I think I may venture to say, without fear of contradiction, that gas property was never so valuable as it has been during the period mentioned in the bill, and I wish members of the court to bear that in mind, because it is an exceedingly important point, when I tell you why those shares have so risen in price. We have been suffering, as you know, for many years from two evils. The first is that we have had a very bad and a very insufficient supply of gas, and the second that we have had to pay for this gas a very high price. That has been done for the purpose of enabling the shareholders of these gas companies to divide 10 per cent. upon their capital. The natural result is that, as the companies have been enabled to pay 10 per cent. —and, I am sorry to say, they have received the sanction of Parliament for it— gas shares are valued at the present time at almost 80 per cent. above par. That, I take it, upon the average, is the value of gas property at the present moment—about 70 or 80 per cent. above par. And recollect this value is not the result of a legitimate commercial undertaking; it is not the result of the working of the ordinary law of supply and demand, but the result of parliamentary interference, whereby these gas proprietors have been enabled to divide amongst themselves 10 per cent., and only on this ground is it that the value of gas property has so largely increased. And it is done in this way—the capital of the gas companies is really called for before it is wanted, and it is called up merely for the purpose that 10 per cent. may be paid upon it. It is a known fact that The Gaslight and Coke Company, I believe in 1872, raised an extra capital of £1,000,000, and that at the present moment those shares are worth £1,800,000; and I believe I am right in saying that I see notice is given by one company that they are about to raise £500,000. Just see how it is done. When fresh capital is required, it is raised by the issue of new shares, and those shares are not offered to the public, but to the existing shareholders, *pro ratâ*, and we all know as a positive fact that when allotments are made, and the first call is paid, those shares are frequently worth on the Stock Exchange double the money paid upon them. And mind you this is before the capital has produced anything by its working; it has not been used or employed; but simply because Parliament has sanctioned 10 per cent. The moment the shares are allotted to existing shareholders, and £2 or £3 paid upon them, they are worth double. Just see what the effect of this is. Instead of the gas companies working with a capital of money positively subscribed, the existing capital has been increased almost 80 per cent., and they are not working with that capital, but with the capital that has been subscribed; this 80 per cent. is merely additional money created to put into the shareholders pockets, and has nothing whatever to do with the working of the company. Now, then, I ask this question—this is my moral. Are we, as a corporation, prepared to say that we will purchase gas property at existing prices—prices that have been raised in the way and manner I have suggested? (Hear, hear.) It seems to me one of the most monstrous things I ever heard of, that gas property, raised by these artificial, these unnatural means, and not in the ordinary way in which men making their money in business raise it, should be purchased by us at exising prices, as proposed in this bill. (Hear, hear.) It comes to this, that the ratepayers of the City and of the metropolis, having been compelled to pay a very high price for gas, which price has gone to increase the value of gas property, are now to be called upon to pay the market value of the property of the company so increased. That is the proposition of this bill, and I ask candidly whether the court are prepared to say that this is a right and a proper thing to do? I want information on the point. I may be wrong; it may be shown that this is a right and a fair price; but, without that knowledge, it strikes me as a most exorbitant proposition, and, therefore, I ask the chairman, or any member of the Gas Committee, to enlighten me upon the point, and let me see how they have arrived at this particular conclusion. (Hear, hear.) I now come to a most extraordinary clause, and that is one which empowers the corporation to purchase of the Metropolitan Board—or, rather, perhaps, I had better go now to the question of how the money is to be raised. Clause 38 empowers the Metropolitan Board to create a fund, to be called the "Gas Fund," and that fund is to be raised in the same way as the Metropolis Loan Fund—*i.e.*, by borrowing money upon the security of the rates. Now, I wish the court to bear in mind a most important fact in connexion with this, and that is that the Corporation of London pay the Metropolitan Board of Works one-eighth of the rates raised by them throughout the whole metropolis. And you will see that I have a meaning in telling you that as I proceed. I have before me the last figures issued by the Metropolitan Board, in which they show that they will require a certain sum of money for the current year, and the precept issued to the City of London shows that, of that sum of money, we shall have to contribute one-eighth. Now, the working of it, my Lord Mayor, is just this, that whatever responsibility, whatever liability, whatever loss, whatever deficiency, there may be in working these gas undertakings, the corporation will have to bear the burden of one-eighth, because, if there is a deficiency, that deficiency must come out of the rates, and to those rates the corporation contribute one-eighth.

Mr. Bontems: You mean the City.

Mr. Shaw: I do not wish to interrupt my friend, Deputy Fry, but I think I shall be able to explain when he has done.

Deputy Fry: If it is, as I have stated, when we come to the question of the purchase of the companies, I think you will see something that is very extraordinary. The clause to which I now refer is one whereby the corporation can purchase. There is an alternative here—one proposition is that the Metropolitan Board may supply the City of London with gas, which, I hope, we shall never agree to. (Hear, hear.) I confess, myself, at once that I would rather be served by the gas companies than that the City of London should be served by the Metropolitan Board of Works. (Hear, hear.) I hope, therefore, that the court will express a very strong opinion that they will never consent to the Metropolitan Board supplying gas in the City. (Hear, hear.) It never was intended, when the corporation took up the gas question, that they should become dependent upon the Metropolitan Board for a supply, and I, for one, would rather fight the gas companies than be dependent upon them. (Hear, hear.) The other alternative is, that the corporation may purchase from the board the works, and mains, and pipes that are necessary to enable them to supply the citizens with gas. Now just listen for one moment to the very extraordinary bearing of this question. The Corporation of London, first of all, being a kind of partner with the Metropolitan Board in purchasing the whole of the companies, may then buy back from the board those particular works, mains, and pipes necessary for them to furnish a supply of gas in the City themselves! And this is to be done for a consideration, to be settled, if possible, between the corporation and the board, and, failing that, by arbitration. Now, just see for a moment the working of that. It amounts to this, that if there should be a loss in the working of the gas undertaking in the hands of the board (and when I talk of loss and deficiency, recollect I have a right to speak of possibilities—it may be probabilities)—for, my Lord Mayor, we are living in strange times, and, in the progress of events, some new illuminating agent may be discovered, which, if it does not entirely supersede, may, at least, materially interfere with the supply of gas, and, therefore, I say we have a right to look to the future, and if there should be a loss in the working of this undertaking in the hands of the board, the metropolis will have to bear the burden of it, the City proportion of that burden being one-eighth of the whole amount, and, in addition to that, if any loss or deficiency arises in the supply of gas by the corporation in the City, when they repurchase the works required by them from the board, why we must bear the whole of that too. So that the City of London is placed in a very peculiar position by the provisions of this bill. I do not know whether the Gas Committee are aware that this is the arrangement proposed, or whether they think this is an equitable way of dealing with the matter. As the proposal now stands, I think it is most unfair and unjust. Now I come to

* Since the above was first presented to the Gaslight Association, I have discovered that very appreciable additional traces of naphthaline condense and remain throughout the final desiccation in the cotton tubes, E and F, and have, therefore, been rated as solid matter mechanically suspended.—H. W.

the question of the great advantages which are to be derived from all this. I have referred to some of the clauses of the bill, which are very lengthy, without reading them at length, word by word, and when I come to look for the advantages to be derived from the passing of the bill, I expected to find them embodied in a very long clause. But I find them contained in a very short clause, which I will just read in its entirety. It is clause No. 32, and is as follows:—"The price to be charged by the Metropolitan Board for the gas supplied by them to the consumers shall, from time to time, be fixed by them at the lowest rate which the requirements of this Act will permit!" Well, where are the requirements? What are they? I have been looking over the bill, and I confess I cannot find any. And so, gentlemen, when it is known to-morrow that we have been discussing this bill, and you meet one of your constituents, he will say to you, "I find you are engaged in a very extensive undertaking, and are about to expend an enormous deal of money in purchasing these gas-works. Do, pray, let me know what are the special advantages and benefits that the citizens are to derive from all this?" What reply shall you make? Why, you will take him by the shoulder, and say, "It is perfectly true what you say, my dear friend, we are engaged in an enormous undertaking; it is a great speculation, and involves grave responsibilities; we cannot tell how it will turn out, but we can promise you this inestimable boon, that you will get your gas in future,' 'at the lowest rate which the requirements of this Act will permit.'" That is all the answer you can give to your constituents; that is the only reason you can assign why you are expected to sanction the bill now before us. Well, then, there are other clauses in the bill not undeserving attention. I see that by one of them the Metropolitan Board take upon themselves all liabilities, all losses, all contracts, all cases or causes of action, known or unknown, belonging to the gas companies, pending or to be introduced; they take over the whole of the responsibilities of the companies, without actually knowing what they are. They know nothing of these liabilities or of these actions, and yet they assume the responsibility of the whole, and place themselves exactly in the position of every gas company they purchase. I ask the members of the Gas Committee whether they know anything of these liabilities; whether they know anything of the actions pending or to be introduced? If not, I say that, in entire ignorance on this important point, they are asking us to consent to a bill which will saddle us with the full share of our responsibility in those proceedings. (Hear, hear.) And I ask the court whether, under all the circumstances, I am not fully justified in seeking for this information? (Hear, hear.) And information is all that I do ask. I do not condemn them for having done wrong, for I am not in a position to do it; but I say, on the face of things, and having exercised my common sense in looking through this bill, it certainly does appear to me that much further information is needed before we are committed to its promotion. (Hear, hear.) I have seen lately a report to the Metropolitan Board from their Law and Parliamentary Committee, which shows that they, at least, have some other object in view. They are proposing another bill, which I have not been favoured with a sight of; but the effect of it is this, that, if the bill for the purchase of the gas-works falls through, this other bill for regulating the gas companies is to come into effect, under which the companies are still to pay dividends of 10 per cent. while the price of gas is fixed at 3s. 9d. Why, 3s. 9d. is more than the South Metropolitan Company have been charging for a number of years, and yet, if this alternative bill passes, we are to be saddled, by legislative enactment, with 3s. 9d. in perpetuity, in order to give the gas companies 10 per cent. Now, I ask any commercial man here, what right have Parliament to interfere, and say that any company shall pay 10 per cent. to their shareholders. Is that done in railways, or in any other business whatever? Never. I could point to railways at the present moment which are not earning anything for their shareholders, and would they be justified in going to Parliament, and saying, "We have constructed a railway, we carry passengers, we are conferring a great benefit and boon upon the trading public, but we cannot pay our shareholders, and therefore we ask you to come to our help, and guarantee us some dividend." No; and yet what is the difference? I say, in my humble judgment, it was a wanton interference on the part of Parliament, at any time, to come to a decision that gas companies should, by legislative enactment, be entitled to pay 10 per cent. But, because Parliament has once done that, is it to remain so for ever?

A MEMBER: They never have done it.

Deputy FRY: Parliament have given their sanction to it. What does the honourable member mean? Why, only recently, because the price of coal was high, and the dividends of some of the gas companies were placed in jeopardy, what did they do? Why, certain commissioners, appointed under an Act of Parliament, went in and raised the price of gas to the public, so as to allow these companies to pay their 10 per cent. What was that but a parliamentary sanction to an increase of price to secure the 10 per cent. dividend? Now one word with respect to the price of gas shares. The commercial value of gas shares is only 6 per cent., because persons who purchase £100 shares and pay £180 for them realize, of course, only 6 per cent. That will tell you what is the commercial value of the property. It is of no use telling us that they ought to have 10 per cent. because it is a very risky business, and therefore ought to be environed with all necessary safeguards. I say "No;" because there is a large investing public who are content with 6 per cent. for their money. And mind, these shares are not to be had every day even at that. The holders are too fond of them, and therefore they are not scattered in the market like some other shares, to which I might make special reference. And therefore I say, with regard to the commercial value, it is not 10 per cent. The commercial public, who know pretty well what they are about, say: "No; we are perfectly satisfied with 6 per cent., and for your £100 shares we are prepared to give you £180." Well, my Lord Mayor, under all these circumstances, I merely ask the plain question for information. Have I done right or wrong in bringing before the court the provisions of this bill, and asking whether you are satisfied that this is the right and proper thing to do without the further information which I seek? I ask you, therefore, to agree to the motion which I have put upon the paper of business. I say to the Gas Committee: "We are in the dark, give us light; we are ignorant, give us knowledge;" and if you can show that this is the right thing, and the proper thing for us to do, if you can show that the provisions of this bill are just and equitable, I shall be content to take it; but, as at present advised, I say it is one of the most unjust, unfair, and one of the most damaging propositions to the revenues of the City of London that I ever met with; and I say that, if we cannot get better terms, if we cannot secure the object we have in view in any other way than this, my strong advice is to leave things alone as they are; let us

——rather bear those ills we have,
Than fly to others that we know not of.

(Cheers.)

Mr. FRICKER: I second the motion. This is a question which deals with such enormous interests, and contemplates the expenditure of such enormous sums of money, that I think my honourable friend has done perfectly right, at this stage of the proceedings, to call attention to the matter. My friend has told you that he does not want to thwart the committee in their proceedings, but he tells you that the time has come when the important interests which are involved entitles the court to some information as to what the Gas Committee have already done. He calls upon them to give us all the information in their power, so that we may have the opportunity of considering our position before any further proceedings are taken. And I think that, as this court are the representatives of the ratepayers and consumers of the City, who have to pay for the gas, my friend is not asking too much when he requests that, before proceeding further in Parliament, we should be able to form a judgment of the advantages or the disadvantages of the plan to which we are being committed. (Hear, hear.)

Mr. SHAW (chairman of the Gas and Water Committee): My Lord Mayor, I have listened with very considerable interest and pleasure to the remarks made by Deputy Fry. I say with pleasure, for his remarks are but a recapitulation of the arguments which I presented to the court in October last, when I brought up the report. The court, on that occasion, feeling with me that it was necessary that something should be done, carried the instructions, which, as Mr. Fry says, were very much in accordance with his own views. I do not quite understand how my friend has come to his conclusions, but his reasons, curiously enough, run on all fours with the reasons which have regulated the committee in the question, so far as they have gone. But, in the conclusions to which he has come in reference to the bill, he is entirely wrong. He says he is "advised" that this matter is a very serious thing, and that it is desirable it should not be proceeded with.

Deputy FRY: No; I am not "advised." I have used my own judgment.

Mr. SHAW: I am not wishing to tie my friend to any particular expressions, for it is as much my wish as it is that of the committee to furnish this court with all the information possible. No information that we have it in our power to communicate shall be withheld from the court. It is too important a question for us unnecessarily to take upon ourselves the onus and responsibility of actions which may hereafter lead to consequences which the court would regret. (Hear, hear.) But let us see what my friend did when this question was brought up and discussed in a court unusually full, a court nearly double as large as the present, and when the report of the committee was carried with a unanimity very unusual on such a question, and when a proposition which was not in the report of the committee was also carried, referring it back to them to consider what steps should be taken to obtain a cheap and satisfactory supply of gas to the City. I will just read the words which my honourable friend used on that occasion. He said, "that after the observations that had been made it was not advisable to leave matters as they now were;" and then he added, "Why does not some bold man move that we apply to Parliament for power to supply gas to the City of London? Had we done so ten years ago, it would have been more easy of accomplishment. If we leave it for another ten years, it will be more difficult than it is now." (Hear, hear.) What were the committee to do when they had an instruction from this court, an instruction, as I said before, sanctioned by an almost unanimous vote, in these terms: "To agree with the committee in their report, and that the committee be instructed to take whatever steps may be necessary, by application to Parliament or otherwise, to ensure a satisfactory supply of gas to the City of London; and that the 23rd and 26th Standing Orders be suspended on this occasion." When this matter came before the committee, they felt its importance, but at the same time they thought it desirable to come again to the court, for this thing was not done in a corner; and when they met, which they did very soon afterwards, they felt that they could do nothing to carry out these instructions without the concurrence of the Metropolitan Board of Works. You must know that an attempt was made, at a very large expense, by the corporation, in 1868, to place this gas question on a satisfactory basis, the result being the passing of the City of London Gas Act, 1868, which, instead of proving a benefit to the citizens, had had an effect entirely the reverse of what was expected. (Hear, hear.) The results were of the most disastrous character—*i.e.*, the companies were enabled to charge a higher price than before, and to make those claims which Mr. Fry has dilated upon, and to raise the value of their shares to an exorbitant price. When we brought up a report on the 5th of November, that report was carried, and the court resolved—"That this court will co-operate with the Metropolitan Board of Works in the introduction of such bills." Well, my Lord Mayor, having prepared the ground to show what we have done, let me say that the committee met; and I must here remark that my friend has made an observation upon which I cannot compliment him, when he spoke of "the ignorance of the committee." I can only say that my friend has exhibited that quality himself most distinctly to-day, in reference to this question. Just let me state what the committee did for the purpose of enabling them to become acquainted with the details of this great question. The committee met on the 28th of October, and they appointed a sub-committee. This sub-committee, between that time and the present, have met 12 times, and been in conference with other committees, while the grand committee has met six times, this question being the sole subject under their consideration. It cannot be said, therefore, that the committee do not know anything of the question, and are in ignorance of the objects of the bill, and of arrangements which, unfortunately, I cannot refer to, for I am told by one of our officers that it would be a most undesirable thing for the question to be discussed. I only state this that my friend may be set perfectly at rest on one or two points. He dwelt very strongly upon the committee having committed the court to a certain course. I deny the thing; there is not a tittle of truth in the statement, and there is nothing in the bill to justify it. I feel entirely as my friend feels, that it is a very serious matter that we should be compelled to enter into arrangements to pay such a high price for the gas property, which by the interference of Parliament has been so exorbitantly raised. (Hear, hear.) But what say the gas companies, my Lord Mayor? They say that the bill we are seeking to carry through Parliament is a measure of confiscation. So you see there are two ways of looking at it. The desire of the committee to carry out their instructions led them to make a large number of inquiries, and to require certain statements to be prepared for them. Of course we have no right to ask that the whole of the private books of the companies should be laid open to us, but we have their published half-yearly accounts, and that is the only means we have of obtaining information on that point. Now, there was an opinion held by one of the officers of the court—an opinion much in accordance with the statements put forward by Deputy Fry—in fact, I may say almost identical. That officer evidently had the opinion (which, however, has been since altered, and he has admitted that it was not right) that in the event of the Metropolitan Board purchasing these works, and including the City of London in the purchase, the City would be liable for one-eighth of the cost. I may tell my friend that there is an arrangement on this point which is not in the bill. It was necessary that we should prepare this bill by a certain date; there was very little time to spare, and it was thought that we need only embody in this bill such general terms; but we have an arrangement, signed by the chairman of the Metropolitan Board and myself, that all these several questions, which have been touched upon by my friend are to be discussed, and an arrangement arrived at, before we agree to anything that will commit us at all. Therefore we are in no way committed. (Hear, hear.) My friend referred also to the manner of raising the money. That was a question that gave rise to great discussion, and we naturally took the advice of the whole of the officers of the court. We have had them all, and the opinion of one of the officers was referred to the whole of the other officers of the court. It was some time before we got the opinion of that officer in writing. I got it a fortnight since, and then I asked his permission to refer it to the other officers for their report thereon, because, being marked "private and confidential," it otherwise prevented me using it. We have now a report from the other officers, and that report, curiously enough, simply suggests what had been already agreed upon by the committee; therefore my friend's charge of ignorance falls to the ground. (Hear, hear.) There was a difference of opinion on one slight matter, and the Remembrancer thought (I do not know whether I ought to refer to it) that it should not be made a subject of discussion in the Common Council. But, if my

friend had written to the committee or to myself, I assure him we should have been pleased to furnish him with the whole of the information, and he would have found that absolutely the argument he has brought forward was directly in accordance with all that has been done, and all the arrangements that have been made. I can assure him and the court that if we had found the terms were of such a character that it would not have been to the interest of the corporation to go further in the case, I and the committee with whom I am acting would have come at once to the court and advised them to withdraw entirely from the arrangement. (Hear, hear.) That is the ground we have taken all along. One of the reports of the officers says, "The purchase bill is so drafted that if it should pass, it will not make it binding upon the Court of Common Council to become the purchasers of any works, unless, after full inquiry, they are satisfied that the purchase will be safe for the corporation and for the benefit of the citizens." I do not know that I should continue my observations further, except to reply to one other remark made by Deputy Fry. It is, in fact, to say that I feel that if there were information in the hands of the committee which they were concealing from the court, and if, like a band of dark conspirators, we were entering into some arrangements by which the corporation would be damaged, it would be a matter, not for inquiry, but a matter for impeachment. I can assure my friend that I have the interests of the corporation at heart quite as much as he or any other member present. (Hear, hear.) Of course, if this court choose now to step down from the position they occupy in the eyes of the citizens, and say, "We will go no further in this matter; we find that the claims of these companies are so great that we are deterred from the proposed purchase," they can do so. It is a question of confidence, so far as the committee are concerned. If the court think that the Gas Committee are not equal to the occasion, and do not understand the nature of the work relegated to them, and if they think we are so blind to our own interests, as well as to those of the corporation—for we are all citizens—and if they think it desirable that it should go out to the public, after the course they have already taken, and which has been almost unanimously approved by the public and the press—by all means let the matter now be stopped. It is a matter to which the committee have given great attention and great consideration, but, of course, I must leave the decision entirely in your hands. Mr. Fry said something about our having gone through this question, and that it was evident we knew nothing about it. I hope I have made it clear that we do know something about it, and that we have taken the only course open to us. In the event of this bill going into Parliament, we shall not appear as promoters unless the terms upon which we can carry it are satisfactory to this court and to the citizens. (Hear, hear.) My friend referred to the possibility of some new mode of illumination arising, by reason of which the use of gas would be dispensed with. That may be so, but I apprehend that gasholders and pipes will still be required for the purposes of distribution. And remember that that element of objection exists in reference to everything—to railways, to markets, to steam-ships; and therefore it simply means that, as Deputy Fry says, we ought to be satisfied with the ills we have rather, than fly to others of which we know nothing. But I think perhaps my friend did not mean what he said. I hope I have laid this question before the court in a way which they will understand. I wish them to understand clearly that the committee are committed to nothing; they have pledged the court to nothing; they have simply agreed to this bill as an element for further consideration, by which agreements may be entered into, and if those agreements are found, when the time comes to exercise our judgment upon them, not to be in accordance with the interests of the corporation and of the citizens, we shall at once advise the court to withdraw from that position, and to wash their hands of the whole affair. (Hear, hear.)

Mr. Bontems: I wish to say a very few words from the consumers side of the question. We have discussed this matter, as to whether it would be a profitable undertaking, in the way proposed by the committee, and I wish now to inquire whether it would be beneficial to the consumers. I quite appreciate my friend's labours, and that of the committee, and, therefore, I would not say a word to disparage their efforts, or to interfere with their proceedings. But Mr. Shaw has said that the Act of 1868 was disastrous in its results to the citizens of London. I am afraid my friend said that without sufficiently thinking of what he was saying. That Act was the result of labours extending from 1865 to the time at which it was carried, and I should be sorry if all the labour and expenditure that that Act cost were useless, or, still more, that it was disastrous in its results. What was the state of the City as to the gas question in 1865? The consumers were paying 4s. 6d. per 1000 for 12-candle gas. The result of the Act of 1868 was to give them 16-candle gas for 3s. 9d. That, of course, was 9d. less in price, and an addition of 10d. in value of gas, making together 1s. 7d. per 1000. I cannot see, therefore, how any man can say that the Act of 1868 was disastrous to the consumers. The Act placed the citizens of London in a different position to that which was occupied by the inhabitants of the rest of the metropolis. The other parts of the metropolis were still under the Gas Act of 1860, excepting so far as the Imperial and South Metropolitan Companies are concerned. And here I would remind my friend that the 10 per cent. dividend was not the result of the Gas Act of 1868, but the Gas Act of 1860.

Mr. Shaw: I did not say it was.

Mr. Bontems: I was led to infer that you considered that was one of the disastrous results of the Gas Act of 1868. What was done by the Act of 1868 was to remove some of the objections connected with the power of taking 10 per cent. One thing effected by that measure was this—that if the companies did not make 10 per cent. in one year, they could not make it up in following years, as they had previously to the Act of 1868 the power to do. Previously they were able to charge loss or defalcation to their revenue, and to pay 10 per cent. dividend as well; but, since the Act of 1868 has been passed, anything resulting from carelessness or the defalcation of an officer must come out of dividend, and not out of revenue. I know the Act of 1868 was not perfect; there was not a perfect provision in it for the purification of gas as to sulphur. It was only lately that any settlement has been obtained as to the quantity of sulphur to be allowed. If you will refer to the report of the gas examiner, Dr. Letheby, you will find that there is not now more than half the quantity of sulphur in the gas as allowed by law. Therefore we have purer gas, and gas of higher illuminating power in the City than we ever had before. That was the result of the Act of 1868. I admit that last year we were charged by the Chartered Company enormously for our gas—5s. per 1000 cubic feet—to make up 10 per cent. The highest authorities have blamed the company for taking that step; but what is the result of the Act of 1868? It is this—though the company got 5s. per 1000 feet last year, they cannot charge it this year; they must revert to 3s. 9d., and they cannot get an increased price again without going to the Board of Trade. With public opinion against them, they are not likely to be so successful as they have been before in that course. There is another reason why we are in a different position to the rest of the metropolis on this question. It so happens that the gas now supplied to the City is supplied entirely by the Chartered Company, the oldest of all the companies. They have expended their capital least profitably of all the companies—that is to say, they have had to pay their capital over and over again to replace works which in the course of years have become worn out, and therefore their capital represents a larger amount at the present time than is the case with those companies who have had the benefit of more recent improvements. And yet notwithstanding that fact they are supplying gas at 3s. 9d., which is the lowest price, comparing capitals, of any other company. It appears to me that the recommendation of the Board of Trade is the best policy for this court to act on, so far as the citizens are concerned, to get reconsidered those clauses of the Act of 1868 that are unfair to consumers. I sincerely hope the Gas Committee will look carefully at that question, and I think if they do so, in the interests of the consumers, they will be doing more good than in joining the Metropolitan Board in building new works or purchasing the existing works on the terms proposed in this bill; for, in the latter case, the consumers will have to pay a higher price for gas than they now do.

Mr. Dresser Rogers: I was very pleased to hear the speech of Deputy Fry, and I was at first, on seeing the notice of his motion, inclined to think that, if I had been chairman of the Gas Committee, I should at once have acceded to it. I see no reason why the committee should not report fully upon what they have done, and that is all that Deputy Fry asks. (Hear, hear.) But I must say that, in my opinion, the present moment is rather too late to consider the terms of the bill, the House of Commons being now in possession of it. And I contend very strongly that Deputy Fry has not shown, by any argument, that the committee have exceeded their instructions from the court. Mr. Fry should know by this time that, in all bills prepared and introduced into Parliament by public bodies, like the Corporation of London and the Metropolitan Board of Works, clauses must be inserted in regard to all points with which it is proposed to deal. When going to Parliament for the purchase of the undertakings of the gas companies, they must set forth some kind of way by which they propose to accomplish that object, and, therefore, the question of the price to be paid was naturally an element for consideration. Mr. Fry has argued most ably with regard to the proposed terms of purchase; but then it should not be forgotten that, when there are two interests at stake, the terms must be fair and equitable; and it must also not be forgotten that the interests of the consumers of gas were not the only interests considered in the House of Commons. A bill, therefore, dealing with such gigantic interests like this must have all the elements of fairness in it. With regard to the question of price, in the regulation bill the price is settled at 3s. 9d., that being the present price charged by some of the larger London companies. Mr. Shaw has shown that smaller companies are charging only 3s., because the capital upon which they have to pay dividend is much less; and I may say that, in the regulation bill, this point has been met. I do not know that I need say anything about the committee, except that I never knew a committee who gave more attention to the matters referred to them. With regard to the charges upon the rates, the questions were so intricate in their character that, unless they were fully considered by the committee before they came up to the court, the efforts of the committee to upset a great monopoly might be frustrated. There have been difficulties in the way, but I am happy to say they are now overcome, and I trust you will continue to give the committee your entire confidence, so that they may complete the work to which they have assiduously devoted themselves. The speaker concluded by referring to the manufacture of gas by the Corporations of Glasgow and Manchester, and stated that the Corporation of Manchester, by taking the manufacture of gas into their own hands, had been able to employ therefrom £60,000 or £70,000 a year in the way of improvements.

Mr. Gover: Two points have been raised in this debate. The first is, how the matter affects the consumer; and the second, how it will affect the City with regard to the Metropolitan Board. First, with regard to the consumer—what does he pay, and what will he pay? He pays now the cost of making the gas, the interest on the capital invested, and a profit, above a normal interest, of about 6 per cent. on the entire capitals of the companies. What will he pay then? The capital will then be borrowed on a plan of terminable annuities by the Metropolitan Board at something between 3½ and 4 per cent. for 56 years. At the end of that time the works will be a freehold property, without charge for interest. The 3½ (or something under 4) per cent. will have a small increment made to it, which addition to the interest will purchase the fee simple of these properties in 56 years. The saving, then, is apparent, because there is 6 per cent. on the capital saved by the consumers directly. But how about the City of London? The Board of Works will borrow upon the rates of the whole metropolis, the City included, and the City is liable for the whole amount. Supposing the City wanted to terminate the bargain, what clause do you require for the purpose? First, that they shall purchase their share rateably to the total cost; and, secondly, the increment of the principal cost (having been liquidated by the successive annual payments from the citizens) shall be deducted from that amount. Now, for the first time, does it arise that it is possible for the Metropolitan Board and the corporation to act together for the supply, on the cheapest terms, for the benefit of the metropolis, of what has almost become a necessary of life; and it can be so adjusted that whether you are in the partnership you shall be on positively equal terms, or whether you come out of the partnership you shall come out on equal terms likewise. This is to be effected by clauses, in the securing of which all the caution and wisdom of the committee will have to be employed. They are acting side by side with able men, who will take care of the interests assigned to them, and I believe the Gas Committee of this court will do the same.

Mr. Cox: I have heard the financial remarks made by Mr. Gover with great pleasure, and I can assure you that, though the Gas Committee have come to no settlement with regard to that very point, they have had it in their minds. Just one observation on what was said by Mr. Bontems, who always speaks with great authority on the gas question, and is a member whose remarks have great effect in this court. With regard to what he said as to the gas legislation of 1868, I differ from him entirely, when he speaks of the good results it accomplished for the City of London. If my friend's observations were to have their full weight, according to my interpretation, they would amount to this, that we had better rest where we are, because he says we are doing well—better than any other part of the metropolis. I say "No" to that. I say that one part of the legislation of 1868 has been the means of wresting three or four millions out of our pockets, because of the increased value it has given to the shares of the companies. (Hear, hear.) In 1868 that gigantic company—the Chartered—were in a poor state; their shares were not worth more than from £115 to £120; but the legislation of that year has increased their value to £180. I say that the gas companies alone have benefited by all recent legislation, and that the consumers have not had any benefit. (Hear, hear.) Mr. Cardwell, in 1868, expressed an opinion that, looking at past legislation, the effect had been to increase the profits of the companies, and not to give any benefits to the consumers, and I say that the result of the legislation of that year has been to carry out the same principle. My opinion most decidedly is this, that you had better be content with things as they are, than go for any fresh regulations, for fresh legislation only tends to rivet the chains of the consumers. There is one point upon which I should like to have the opinion of the court, because it is a leading principle in this bill. Of course, any successful working of these undertakings, if they fall into the hands of the municipal authorities, will depend upon the price to be paid for them. Now, Mr. Fry alleges it as a kind of charge against the Gas Committee that they have agreed in this bill to insert such terms of purchase as, in his opinion, appear most unjustifiable, and which would lead the corporation into inextricable difficulties. This is a matter which was not decided by the committee until the very day before the bill was lodged in Parliament. Not only amongst themselves, but in conjunction with those with whom they are associated, this was a matter for very grave consideration. I am not going to state anything that will lead to any difficulties, for reticence, on this occasion, I believe, is very essential; but I may say that all parties did agree to this—that, considering the legislation of past years, and more particularly considering the legislation of 1868, it would be madness to go to Parliament for any dealings with these companies, unless we were prepared to pay them the market price for their shares. Well now, if this court are acted upon

by the views which Mr. Fry enunciated, they will say that they will never pay the price of those shares. If the court take that course, and think the price put into the bill is untenable, they may just as well say so at once, and so wash their hands of the bill altogether. For, as the bill stands, we are committed to that, and the court had better understand it. I may say that if Deputy Fry's notice had never appeared upon the paper of business, the Gas Committee would have reported to this court before taking any step; they would have reported before this time but for certain papers which have just been laid before them, and which I have not yet seen. We shall have a special meeting to consider them, and as soon as we have come to an opinion upon them I have no doubt the committee will come to the court and leave it for them to decide. But if the court at once say that the market price of the shares is more than we should offer, it is useless for us to consider the provisions of the bill any more. (Hear, hear.) I do not mean to go into other parts, which have been gone into thoroughly, but I do ask the court to say at once if they consider the price we have put into the bill, as a price to be given to the companies, is not correct in principle, and thus relieve us from proceeding any further.

Mr. BEDFORD: I do not know whether the chairman means to oppose the motion.

Mr. SHAW: I do, because a report cannot appear.

Mr. BEDFORD: I am sorry to hear it. We are told that this bill is to produce large profits in the manufacture of gas. I was surprised to hear that from Mr. Gover, as I look upon him as the great finance authority of this court, but in this instance he has made a great mistake. He says we shall make 6 per cent., because whereas we now pay 10 per cent. we shall then only pay 4. But my friend forgets that a large portion of the money of the companies is raised on debentures, paying 6 or 7 per cent., and not 10 per cent., so that there is a large reduction in the estimate to be made. Still more extraordinary, he forgot that for every £100 share we are to pay £180, so that there cannot be a surplus profit of 6 per cent. My friend, Mr. Rogers, has brought forward the old case of Manchester. I should like to see it proved, that they make £60,000 or £70,000 a year profit.

Mr. DRESSER ROGERS: You will find in the library the accounts of the corporation, which will give you the particulars.

Mr. BEDFORD: Well, suppose these large profits are made by us, who is to have them? Are they to go in reduction of the price of gas, if so, what is to become of the large sum out of profits for other purposes? But, on the other hand, suppose the price of coal goes up, as it did last year, and there is a necessity for increasing the price of gas, what will the public say to the corporation then? Are the corporation to be dealers in gas, having accounts with every consumer in the City, sending in bills, and raising and lowering the price according to their will? Or is the price to be settled and fixed in the Act so as to leave no profit over the cost in the charge to the consumer? If that be so, it strikes me that the corporation are undertaking an enormous responsibility without the possibility of any gain, and with the probability of an enormous loss. (Hear, hear.) I say we are buying this property at its highest price. My friend says we must take into consideration the chance of something being introduced that shall supersede gas, or that will, at least, reduce its value considerably, and for which these works may not be appropriate. No doubt we ought to do so. Why, the great chemists of the day tell us that we are on the eve of some vast discovery. And are we, under such circumstances, to come forward at the present moment to purchase these works at a prodigious price simply because the citizens last year drifted into a state of panic on account of a temporary rise in the price of gas. Why, that is all over now, and the consumers are satisfied with gas at 3s. 9d. Is it to be supposed that the corporation will ever sell gas at a lower price? I do not believe they ever will. Remember, the costs of the coming contest will be something enormous, and we shall have to pay the costs of both sides, because the gas companies charge all parliamentary costs as part of their ordinary expenditure, and our own expenses will be by no means small. What I say, therefore, is, that we are taking wrong steps to obtain a desirable object. We ought to have gone in for increased supervision and audit over the companies, and I believe if we had we should have obtained all we could reasonably desire. I must object to the corporation being involved in an expenditure of £2,000,000 in a measure which, under no circumstances, can be attended with an adequate result.

Alderman SIDNEY: I think the proposition of Deputy Fry, though appearing very reasonable, is both ill-timed and unreasonable. To my mind, the views he has enunciated should have been stated before any action was taken by the committee. Of course, there cannot be a doubt that if the court want information they are entitled to have it, and I know that no committee would hesitate to afford it when requested. But bear in mind what this motion is. It asks that information shall be given "prior to the committee taking any further action." I do not suppose that Mr. Fry wishes to make the court look ridiculous in the estimation of the public, because he must be aware that action has been already taken by the corporation in conjunction with the Metropolitan Board; that they have gone hand in hand in introducing three bills into Parliament, the first for power to erect works, lay down pipes, and carry on the manufacture of gas; the second, to purchase up the undertakings of the existing companies; and the third (in the event of the Legislature not agreeing to the two first), to impose such regulations upon the companies as shall secure a better supply to the public. Can Mr. Fry really be in earnest in endeavouring, under the guise of asking further information, to cast a suspicion upon the motives of the committee; for that would be the consequence if his motion were carried. How are the Metropolitan Board to act if the corporation should now lay an embargo upon their committee, and say they are no longer entitled to act on their behalf. It would be a most painful position to be placed in. But now comes the question—was it right for the corporation and the board conjointly to undertake the prosecution of these bills? There has been much murmuring, and, I think, justly so, that the quality of the gas supplied for many years in London is not what it ought to be, and that, considering the immense consumption, the price is much higher than it need be. I may be wrong, but, from the best information I have been able to obtain, I believe that the gas supplied to the metropolis ought not to be charged at a higher rate than 2s. 6d. per 1000. It was said, I think, by Mr. Fry, under a great misapprehension, that the committee, by their bill, were securing to the companies 10 per cent. and a price of 3s. 9d. We do not secure anything of the kind, but there are provisions in the No. 3 bill that 3s. 9d. shall be the maximum price, and that the dividend shall never exceed 10 per cent.; with a further provision that if the price of 3s. 9d. is increased, there shall be a corresponding reduction in the rate of dividend. It is also provided that if any further capital is raised by the companies, it shall be offered to public competition, and that the profits on such capital shall not exceed 5 per cent. Now I earnestly hope that Mr. Fry, justified as he certainly is in obtaining all the information from the committee, will not, after what has been said, think it right to press his motion adversely to them. It will only paralyze their action and create a want of confidence in them, and it will not correctly represent to the world what are our views in this matter. I had always understood that the corporation were unanimous in the gas question. We are not seeking to make any profit by this movement, and I should be sorry it should be thought that we are entering upon the question with any desire to benefit the corporation. Neither are we jeopardizing the funds of the corporation. We are acting simply on behalf of the gas consumers, and I need not say more than that I believe all the steps hitherto taken in the matter, have been thoughtfully taken. No doubt it is an immense question; the amount involved is something like £13,000,000 sterling; but that will be raised, and easily raised, by debenture bonds. It is to be regretted that the question was not taken up many years ago; still, it is a question which, the longer a settlement is delayed, the more difficult will it be to deal with. The public have no power to deal with it except through their representatives, and I say, in the face of all the facts which have come before us, I trust there will be no attempt to paralyze the action of the committee in the course they have felt it right to adopt. (Hear, hear.)

Mr. M'GEORGE: This question is one of the greatest importance that has come before us for some time, and I confess that I think very little damage, as far as the committee are concerned, has been done in reference to it at present. The committee were directed to take action up to a given point. We have been told again and again that the committee are not the corporation, and I apprehend there can be no doubt that they cannot bind the corporation if they take decided action in a matter not referred to them. I assumed all along that the committee were acting with the Metropolitan Board as fair partners in a great concern, and, so far as that, we might or might not agree with them. But I think I can show that the corporation are not fair partners in this matter. I think one of the clauses of the bill is exceedingly objectionable. It is proposed that where bonds are given for the purchase of the works, as a whole, they shall be metropolitan bonds, but that for the part we buy we shall give bonds of the City,

Mr. SHAW: You are quite wrong. I thought I explained that to the court. The arrangements—I am almost drawn into stating matters which I would rather not go into, because I have no reply—it is utterly misleading the court. I am sure the statement is not intentionally misleading, but you do not know the arrangements which are now in negotiation.

Mr. FRICKER: That is the reason why we ask information.

Mr. HARTRIDGE: We do not want to be bound.

Mr. SHAW: I think it is very detrimental to the whole action taken by the committee to continue this discussion.

Mr. FRICKER: No; not a bit.

Mr. SHAW: Well, it is a matter for the court; I only say I am advised by the officers of the corporation. If gentlemen will go on, they must take the matter in their own hands.

Mr. M'GEORGE: I have not the slightest wish to say anything against the committee. In producing a bill, they were doing what they were instructed by the court to do, but I say there are some clauses in that bill I cannot support. I have no intention to weaken the hands of the committee in saying so. Look at clauses 46 to 49, and say if the special corporate property of the City is not pledged for the bonds that are to be issued.

Mr. SHAW: There is an arrangement by which no such clauses are to be forced in the bill.

Mr. M'GEORGE: Have the clauses in this bill been withdrawn?

Mr. SHAW: No; but there is an arrangement which is in negotiation.

Mr. M'GEORGE: I ask, if the whole of the rateable property of the metropolis is to be the security, why should the City's property be pledged for any part of the citizens share? If we are fair partners it will not be, but our one-eighth part of the rateable value of the whole will be answerable for our proportion of the works to be acquired. Then there is a question in my mind whether we ought not to go to Parliament for a repeal of the law which gives gas companies 10 per cent. Until the 10 per cent. guarantee is done away with, the question will not be put on its fair commercial basis. Are we going to agree that these companies shall receive 10 per cent.? If that is what the committee have done, we do not confirm it; but this is the first time we have had an opportunity of asking about it. Alderman Sidney talked about other bills, but we know nothing about them; we have only one before us, and we know nothing about private arrangements and negotiations.

Mr. SHAW: The other bill is not out yet.

Mr. M'GEORGE: Then we do not want to be pledged to it. The 38th clause of the bill before us gives the Metropolitan Board power to pledge the whole property of the City, and we shall then have to pay for our share back again.

Mr. SHAW: I have explained to the court that it is not so.

Mr. M'GEORGE: I should be exceedingly sorry to say anything offensive to the chairman, but I certainly read it so. Then, with reference to the price to be paid to the companies, I hold that, to take the average of three years, is far too short; we ought to take the average of five, or seven, or even ten years. These are all questions we ought to discuss. We are being pledged to an enormous amount of money. I do not believe any private individuals would buy this property on such a short average, and I say to the committee that we will not agree to that short average.

Mr. GAME: I do not understand that the corporation are desirous to withdraw from this business; but, remembering what took place in 1860 and 1868, and the enormous costs incurred, with so little benefit to the consumers, they desire to have all the information that is to be obtained before they commit themselves finally to the course they shall pursue. I cannot think that any harm would come of Deputy Fry's motion; it simply asks that the corporation should know what is being done. Very large powers were given to the committee, perhaps larger than were ever before given to a committee, and the reports we have received from them hitherto are certainly most meagre. I therefore think the court are under obligations to Deputy Fry for bringing forward this matter.

Mr. ISAACS said he should like to appeal to Deputy Fry, and suggest to him that, after the discussion which had taken place, he might with justice and consistency withdraw his motion. (No, no.) He would tell the court why. It struck him that it was scarcely possible for the committee to give any further information than the court had already had. He expressed an earnest hope that the corporation would not now withdraw from this matter, and, referring to some of the clauses of the bill in detail, he contended that, so long as the corporation could recoup itself of its outlay, and supply the citizens with gas at cost price, they would have done a great work. Mr. M'George had raised an objection to the proposal to give the gas companies the market value of their shares, taken on an average of the last three years. But he would ask the court to look at the facts. How many hundreds and thousands of persons were there who had bought gas shares at their present price—men in humble circumstances, widows, clergymen—(oh, oh!)—it was all very well to say "Oh, oh," but he wanted the court to understand what was on the other side of the question; and he would ask again how many of these investors had not purchased at such a price that they only got 6 per cent. on their money. Their name was legion; and they had bought on the faith of what had been done by Parliament, and 6 per cent. to such investors was not one fraction too much. (Hear, hear.) As far as he was concerned, and, speaking in the interests of the corporation, he would say they were thoroughly entitled to it. Mr. M'George advised that the purchase should be taken on the average price for the last five or seven years, but did the court suppose that Parliament would listen to such a proposal. (Yes.) Well, then, the honourable member's faith in Parliament was greater than his, and he believed it was in no wise justified. ("They ought to do it.") Clearly, they ought, but they would not, and the experience of the corporation taking matters before Parliament connected with the gas companies satisfied him that the House of Commons would never sanction the buying up at an average price over a longer period. Then Deputy Fry had raised a great objection to clause 32 in the bill, which enacted that the price to be charged by the Metropolitan Board (and he presumed the same rule would apply to the Corporation of London) should be the lowest price the requirements of this Act would permit. He (Mr. Isaacs) could not conceive what more could have been asked in the interests of the consumers. My friend, continued the speaker, tells us that we had better bear the (h)ills we have. If they were very small hills, I

say "let us bear them." But what are they? They are such hills as rise higher and higher every day. (Laughter.) These hills were hills, but they are now becoming mountains, and mountains that are constantly increasing. (Renewed laughter.) In continuation, Mr. Isaacs urged that the secret of the cause of the recent increased price, which the consumers of the Chartered Gas Company had been called upon to pay, was not the advance in the price of coal, but the inordinate amount of capital upon which they had to pay the full dividend of 10 per cent. He repeated that the committee had given Deputy Fry all the information he could possibly desire, and they would, in his opinion, be sacrificing the dignity and honour of the court if, taking into account their connexion with another body, they were now to turn tail and leave the Metropolitan Board to fight the battle by themselves.

Mr. Jessie Turner and Mr. T. S. Richards, amidst loud cries for a division, endeavoured to address the court, but their observations were not heard, and after a minute or so, they each yielded to the ruling of the Lord Mayor that the court were now anxious to close the debate.

Deputy FRY then addressed the court in reply. He said that when in autumn last he asked why some "bold man" could not be found to take up the question, he meant a bold man to frame a wise measure. In the present case the promoters were exceedingly bold, but he could not compliment them on being equally wise. He called upon the court to remember that if they refused his motion they virtually admitted that the price of gas shares inserted in the bill was the price which the corporation ought to pay. It was all very well for the chairman of the committee to say such was not the meaning; he had the bill before him, and without reference to mysterious agreements between the chairman and others, he contended there could be no other interpretation of the terms here employed. In bringing forward this motion, he felt that he had done his duty. He entertained a very strong opinion that if no change took place in the provisions of the bill it would be a most unwise proceeding on the part of the corporation to assist in its promotion, and that if it were prosecuted through Parliament in its present form the advantages contemplated by many, and which all desired, would never be realized.

A show of hands was then taken, and the LORD MAYOR declared the motion to be lost. On a division the numbers were—

For the motion	42
Against	59
Majority against	17

MILE END OLD TOWN.—At the meeting of the vestry on Wednesday last, Mr. Newton, their representative at the Metropolitan Board, replying to a question, and referring to the bill for regulating the gas companies, said he attached far greater importance to that bill than to the others introduced by the board, because it was a bill which would regulate as far as possible the supply of gas to the metropolis by the existing companies, and if the companies would accept those conditions, he did not want to have anything more to do with the supply of gas. To obtain this bill, it would be worth spending a little money, although he did not believe it would operate injuriously to the shareholders, but would rather tend to place their property on a secure and firm basis.

METROPOLIS WATER SUPPLY.

The Registrar-General publishes the following returns of the average daily quantity of water supplied by the London water companies, during the months of December, 1874, and January, 1875. It appears that during December 106,107,278 gallons, or 482,094 cubic mètres of water (equal to about as many *tuns* by measure, *tons* by weight) were supplied daily; or 206·4 gallons (93·8 decalitres), rather less than a *ton* by weight, to each house, and 29·1 gallons (13·2 decalitres) to each person. It is estimated that about 82 per cent. of the total supply of water is used for domestic purposes.

COMPANIES.	Number of Houses, &c., supplied in Dec., 1873.	Dec., 1874.	Aver. Daily Supply of Water in Gallons* during Dec., 1873.	Dec., 1874.
Total supply	506,985	514,142	109,367,072	106,107,278
From Thames	238,248	241,550	57,938,124	54,757,682
„ Lea and other Sources	268,737	272,592	51,428,948	51,349,596
THAMES.				
Chelsea	28,395	28,490	7,725,700	7,240,000
West Middlesex	45,330	46,404	8,663,544	8,634,746
Southwark and Vauxhall	79,515	79,856	18,989,166	17,160,000
Grand Junction	34,718	35,144	10,860,914	10,219,436
Lambeth	50,290	51,656	11,698,800	11,503,500
LEA AND OTHER SOURCES.				
New River	121,810	122,792	24,177,000	22,925,000
East London	104,481	106,459	21,038,593	22,081,800
Kent	42,446	43,341	6,213,355	6,342,796

* Including that for manufactures and for various purposes other than for domestic consumption.

Note.—The return for December, 1874, as compared with that for the corresponding month of 1873, shows an increase of 7157 houses, and a decrease of 3,259,794 gallons of water supplied daily.

During the month of January, 1875, 108,399,761 gallons, or 492,510 cubic mètres of water (equal to about as many *tuns* by measure, *tons* by weight) were supplied daily; or 210·4 gallons (95·6 decalitres), rather less than a *ton* by weight, to each house, and 29·6 gallons (13·4 decalitres) to each person. It is estimated that about 82 per cent. of the total supply of water is used for domestic purposes.

COMPANIES.	Number of Houses, &c., supplied in Jan., 1874.	Jan., 1875.	Aver. Daily Supply of Water in Gallons* during Jan., 1874.	Jan., 1875.
Total supply	508,329	515,292	109,118,500	108,399,761
From Thames	238,366	241,683	57,905,464	54,212,319
„ Lea and other Sources	269,963	273,609	51,213,036	54,187,442
THAMES.				
Chelsea	28,395	28,490	7,793,100	7,097,600
West Middlesex	45,375	46,440	8,726,122	9,249,447
Southwark and Vauxhall	79,525	79,888	18,988,275	16,159,500
Grand Junction	34,718	35,144	10,958,367	9,828,572
Lambeth	50,353	51,721	11,439,600	11,877,200
LEA AND OTHER SOURCES.				
New River	121,839	122,890	23,773,000	23,953,000
East London	105,562	107,294	21,096,100	23,322,800
Kent	42,562	43,425	6,343,936	6,911,642

* Including that for manufactures and for various purposes other than for domestic consumption.

Note.—The return for January, 1875, as compared with that for the corresponding month of 1874, shows an increase of 6963 houses, and a decrease of 718,739 gallons of water supplied daily.

Dr. Frankland, F.R.S., reports, as the result of a chemical analysis of the waters supplied to the metropolis during January, that, taking the amount of organic impurity in a given quantity of the Kent Company's water (derived from deep wells in the chalk) as unity, the proportional amount of this impurity in an equal volume of the river waters supplied by each of the other metropolitan companies was—New River, 2·7; West Middlesex, 4·0; East London, 5·7; Southwark, 5·9; Grand Junction, 6·0; and in both Chelsea and Lambeth, 7·5. The Chelsea, Grand Junction, Southwark, and Lambeth Companies again supplied Thames flood water of "very bad quality," and very inferior to that delivered by the West Middlesex Company. The East London Company's water, derived partly from the Lea and partly from the Thames, as regards "dissolved organic impurity," was no better than the Thames flood water. The New River Company's water was inferior to that supplied in December, but was much superior to any river water supplied by the other companies. The samples of the Chelsea, Southwark, and Lambeth Companies waters were somewhat turbid from imperfect filtration, and the suspended matter in each case contained moving organisms, "whilst considerable quantities of the mycelium of a fungus were found in the Chelsea and Southwark waters." The Kent Company's water, from deep wells in the chalk, was uniformly bright and palatable.

METROPOLITAN BOARD OF WORKS.—At the meeting of the board on Friday last, the following report was brought up from the Fire Brigade Committee:—"Your committee reported on the 23rd of December last that they had caused a letter to be addressed to the metropolitan water companies, suggesting that they should endeavour to make some arrangement by which the supply of water at fires might be rendered more prompt and certain in the interval of time which would probably elapse before a constant supply of water at high pressure could be established throughout the metropolis. The course taken by the committee received the approval of the board. Your committee have since then received replies from all the water companies, with the exception of the Kent Company, and printed copies of these replies have been sent to the members of the board. As the observations made in some of the companies letters with reference to the placing of hydrants on the mains already constantly charged are of some importance, your committee recommend that the letters be referred to the Works and General Purposes Committee in connexion with the general question of water at fires which is now under the consideration of that committee." Mr. Thompson, in moving the adoption of the report, called attention to a statement contained in the letter received from the New River Company, to the following effect:—"With regard to the suggestion of your committee that the times of turning water into 'mains' should be fixed, and that the men of the fire brigade be made acquainted therewith, the directors of the New River Company have to state that it is only the 'services' branching from their 'mains' which are subject to periodical shuttings and openings, and that these take place at fixed times daily, but to instruct firemen in the times of all such 'service' shuttings and openings would amount to their instruction in nearly the whole of the duties of all the company's turncocks, which could hardly be practicable." There had been a feeling abroad that the firemen were at fault in not being able to get water in cases of fires in the absence of the turncocks. Such a statement from such a committee would show, he thought, at once the extent to which the men of the brigade could be blamed in reference to this matter. The motion was carried.

CHELSEA WATER COMPANY.—At the meeting of the Chelsea Vestry on the 9st inst., Dr. Barclay, the medical officer of health, reported that the water obtained from the Chelsea Water Company's main on the 4th inst. was not so pure as the sample obtained on the 19th ult. The water was slightly opalescent from a faint trace of organic matter, which subsided on standing for some hours. There was consequently a larger proportion of free ammonia, amounting to five thousandth parts per million, the albumenoid ammonia continuing at exactly the previous amount—viz., fifteen hundredth parts per million, a quantity larger than ought to be found in good drinking water. The total solids were found to be 20·5 grs. per gallon, and the chlorine 1·2 per gallon, the former being exactly the amount found a fortnight ago, while the latter had increased one tenth of a grain. The vestry resolved to forward a copy of the report to the company, the Board of Trade, and to Major Bolton, the water examiner.

CONSTANT WATER SUPPLY.—The East London Water-Works Company have notified "to the Metropolitan Board of Works, and every other body and person constituting or being a metropolitan authority within the meaning of that expression in the Metropolitan Water Act, 1871, that they intend, on and after the 1st of July next, to bring under constant supply two new districts or areas, making the fifth and sixth respectively, within their limits."

COMMERCIAL GAS COMPANY.

A Special Meeting of the Shareholders of this Company was held at the London Tavern, on Monday, Feb. 8—THOS. BRUSHFIELD, Esq., in the chair—for the purpose of considering the bill introduced by the directors into Parliament for conferring further powers upon the company, and for the amalgamation of the company with the Ratcliff Gaslight and Coke Company.

The SECRETARY (Mr. Jaques) having read the notice convening the meeting,

The CHAIRMAN said: Gentlemen, to me it is a very gratifying circumstance that we are holding a meeting to consider a bill for conferring further powers upon the company. I recollect the Commercial Company when they had only five retorts; now we have several hundreds; in fact, we have quite overgrown our limits so far as the land we are allowed to possess is concerned. Hence we are driven to Parliament—very unwillingly, I admit—and we are obliged to hold the present meeting to submit our bill for your approval. We are about to propose an amalgamation of the Ratcliff Company with this company, and the terms of the amalgamation are in our judgment mutually advantageous. The Ratcliff is a very good company, and we shall find ourselves quite at home with them. Before I read the resolution that will be submitted to you, our parliamentary agent will inform you of the nature of the clauses in the bill.

Mr. COOPER read the preamble of the bill, and the marginal notes of the clauses.

The CHAIRMAN moved—"That the bill now submitted to the meeting be, and the same is, hereby approved; and the directors are authorized to take such measures as they think necessary to secure the passing of such bill, subject to such amendments being made therein as Parliament may think fit, or as to the directors may seem desirable."

Mr. BRADSHAW seconded the motion.

A SHAREHOLDER: Have you the land to build your new works upon? At a meeting held some time ago it was stated that you were in treaty for purchasing land on the river Lea. I merely wish to know if you have effected the purchase.

Mr. BRADSHAW: Yes; we have the land.

A SHAREHOLDER: Will the Act you are about to apply for set aside our existing Act?

The CHAIRMAN: No doubt it will supersede it to a certain extent.

A SHAREHOLDER: I think, considering our present position and the gas question generally, a bill of this sort ought to be well considered by the present proprietors. The action now being taken by the Metropolitan Board will have the effect of increasing, or very much diminishing, the value of gas property. My impression is that it will diminish it exceedingly, and I think it would have been well if the objects of this bill had been submitted to the proprietors for their consideration some little time previous to this meeting.

The CHAIRMAN: My duty is simply to put the question.

Mr. ATTRELL: Before you do put the question, allow me, as one of the largest shareholders, to ask upon what terms this amalgamation is to take place.

Mr. BRADSHAW: That is answered in a word. Upon equal terms.

Mr. ATTRELL: There is no guarantee?

Mr. BRADSHAW: None whatever on either side.

A SHAREHOLDER: It has been reported that we are already in reality, although, perhaps, not legally, amalgamated with the Ratcliff, and that we have been practically so for some time.

A DIRECTOR: It is not true.

SHAREHOLDER: Well, report says so. I did intend to put the question at our previous meeting.

Mr. COLE: I am rather astonished that the directors have called us to meet on this occasion for a purpose, in one sense, of which we are entirely in the dark. A long bill has been read to us, or, at least, the heads of it, and here we are all at once called upon to say "Yea" or "Nay," whether we shall allow the directors to carry that bill through Parliament. Of course, in carrying that bill, there will be a large amount of expense, and it is a serious question, at this time, whether we shall, at a moment's notice, say "Yea" or "Nay" to a question of which we really know nothing. I should like to have had a report of the Ratcliff Company laid before us, that we may know what dividend they pay. We pay an excellent dividend—I am perfectly satisfied with my small holding—but I should like to know whether the other company are paying an equal rate. It is highly important, in a matter of this sort, that we should know what we are going to launch into. I, for one, am inclined to say, "Let well alone." If we are doing well, let us stand where we are. If not, then before we take the step, I say, "Let us have a little more information than we have at the present moment." I should be glad if some of the directors would inform us how we shall be when we are amalgamated. I do not wish to offer any factious opposition, if the directors have well considered the matter. We place great confidence in them, and if they feel themselves bound to carry out this amalgamation, no doubt they have good reason for the conclusion to which they have come. But the information we have yet received on the subject is rather meagre, and therefore I, for one, should be obliged if the directors would furnish us with some little light upon it.

Mr. WYATT: I trust the somewhat prominent position I have been obliged to take with respect to the gas legislation of the last 15 years, added to the fact that I am—for me—a somewhat large gas proprietor, not only in this company, but in others, will be accepted as my apology for troubling you for a moment. I share most fully in the expressions of opinion that have fallen from my brother shareholders with reference to the course which is being pursued to-day. I have looked in vain in the reports of the directors, I have looked in vain in the preamble of the bill, for any justification of the step we are now asked to take. And my practical experience enables me to say that, however willing a body of shareholders may be to accept the *ipse dixit* of the chairman of the board upon a question of this kind, I know that Parliament will not be satisfied with that. We all know what a searching investigation into metropolitan gas legislation has taken place during the last 15 years. I have represented all interests, and both sides of the question, in these inquiries, and therefore trust I may be allowed to offer some friendly suggestions—and they are most friendly—to-day. Now, this appears to me a most inopportune time for the Commercial Company to appear in Parliament. We know the impending clouds hanging over us. We shall soon be embarked in very heavy legislation, and very likely shall draw a blank as in 1867, when, as you all remember, a large amount of money was expended in appearing before Mr. Cardwell's committee, and nothing took place. Now, this appears to me to be a serious matter for our consideration. Prior to 1860, the companies, as declared by Parliament in that year, wisely agreed to divide the metropolis into 13 parts, each taking one, in which they had what amounted to a monopoly. But, unfortunately, the consumers did not think the companies were playing quite fair, and you know the agitation which took place in 1858, and again in 1859, when select committees were appointed to consider the question. You are aware also that these inquiries terminated, in 1860, in what I will venture to call, as between the gas proprietors and the consumers, a parliamentary contract—the passing of the "Metropolis Gas Act, 1860." And here I may mention that, prior to that, I was not a gas proprietor, but so beneficial did I look upon that Act, and so satisfied was I that the companies had the best of that legislation, that my small earnings were at once invested in gas shares. Now, my experience tells me, and there is a gentleman on your left, sir (Mr. Samuda), who knows quite well, that nothing offends Parliament so much, and nothing do they view with so much suspicion, as any breach of a parliamentary contract. Your company, up to the present time, have not attempted that; they have been content with the contract of 1860. What does that give us? The old proverb says, "The proof of the pudding is in the eating." We get our 10 per cent., and we have certain guarantees which are sufficient to ensure, with proper management, this 10 per cent. for the future, and the contract of 1860, as I venture to call it, contains certain safeguards for the protection of the public. What are you doing with this bill? You are provoking opposition, notwithstanding your 10 per cent.; and here I take leave to say that there is a most objectionable item in the last accounts of this company, under the head of "Land purchased," and under the head of "Gas-works," which I know neither the Board of Trade nor Parliament will stand for a moment. There will be an investigation now of your accounts, for which, I dare say, you are prepared, but still remember you are now endeavouring to do what Mr. Cardwell's committee. in 1868, said they would not do—viz, disturb the legislation of 1860. What more can we desire than the 10 per cent., which Parliament has declared they will not disturb us in the possession of? And yet, in the first clause of this bill, you are endeavouring to disturb one of the clauses of the Gas-Works Consolidation Act of 1847, incorporated in your own Act with reference to this 10 per cent. We have hitherto stood upon the Act of 1860, and may still do so. We can appear before any select committee, and say, "The Act of 1860 was the contract made between Parliament and the gas proprietors and consumers, we ask you not to disturb that contract." Instead of that you are now throwing down the gauntlet and challenging them to reopen the whole question, inviting, as it were, your adversaries to come in and say, "This is none of our doings, but since, for your own purposes, you reopen the whole question, we will ask for further alterations." I say it is not fair, it is not right. If we have a surplus, after paying 10 per cent., we, as honourable men, are bound to fulfil the trusts of our contract of 1860, and at once reduce the price of gas. And, as long as we continue in that honourable course, my experience, during nearly a quarter of a century in committees of the House of Commons, assures me that we have nothing to fear from that tribunal. But if we now go to Parliament seeking to evade the contract of 1860, they will never believe us when we say we are doing this in the interests of the public. I trust we shall never insult our common sense by anything so ridiculous. But how is this bill to benefit us? There is nothing on the face of the bill, nor in any of the reports of our directors, to enable us to deal with the question which is now before us, and I should like to know why all this expense is to be incurred? Why have we thrown over our old love, the Imperial? Or is it that the Imperial are not prepared to ally themselves with us? I dare say there is a good answer to these questions, and I pray to be excused if I have fallen into an error, but it appears to me that you are silent in reference to the only thing for our guidance. I do not, therefore, understand why the Imperial are thrown over. And here let me say seriously, and not offensively, that I desire to know what is the meaning of this wish to destroy the present identity of the company? Why do we want to be amalgamated? If we are doing right—and I believe we are—and are earning our 10 per cent., why should we desire a change? At any rate, if you do not disclose to us the reason, you will have to disclose to Parliament why it is, and how the public are to be benefited by the proposed amalgamation. I, for one, most respectfully protest against the bill being proceeded with, and against being mulcted in the costs of fresh legislation, unless I can hear from the directors some good reason for it. I would infinitely prefer, because I know that it would strengthen our position in the eyes of Parliament, and in the estimation of the public, that the amount which will have to be expended in promoting this bill be applied in reduction of the price of gas. When I looked over the bill and saw these revision clauses, I confess I was reminded of an old story which I trust I shall be forgiven for relating. Two unfortunate foreigners, cast penniless on the streets of London, went about seeking employment. One of them, after wandering to and fro for a long time unsuccessfully, in a fit of desperation went into an eating-house and sat down. He was told he might have what he pleased, and, having satisfied his appetite, was allowed to depart without payment. His companion hearing of his good fortune, went into the same place, and, when asked what he would take, said, "What you please;" and he got a good thrashing. Now, you are just going to imitate the Imperial and the Chartered Companies, by asking in this bill for their revision clauses, and I say that, in my opinion, you will meet with exactly the fate of the second foreigner. With the Government irate, and with the representatives of the consumers, both inside the City and outside, promoting bills, I believe that your project will be ignored; your bill will be rejected, and you will have to pay all the expenses, while, even if you got the bill, it would do you no good. For these reasons I do therefore most humbly protest against the bill being proceeded with, unless the directors are in a position to inform us—what, at present, we have no information of—what good is to result from the promotion of the bill. And here I may tell other shareholders who have spoken, and whose views I entirely endorse, that the Standing Orders of Parliament, which require the bill to be submitted to a meeting like the present, provide that if we like to oppose the measure at a future stage, we can do so, but we must make our protest against it at this meeting. And I, for one, shall now ask the secretary, as a matter of form, trusting, however, that I shall not be called upon to exercise my right hereafter, to enter my protest against the progress of this bill. I call upon him to record my protest against the approval of it. I do not know whether it would be more regular to move an amendment on the subject; if so I, will move—"That the bill be considered this day six months."

Mr. LIVESEY: I am not at all surprised to hear the remarks just made by Mr. Wyatt, for if any man has had more to do with violating parliamentary contracts than he has, I am not aware of it. Mr. Wyatt has acted as agent for the Chartered Company, and they have been before Parliament on more occasions than any other company. Mr. Wyatt speaks about the parliamentary contract of 1860; but that parliamentary contract did not satisfy the public, at least, the public thought it was not satisfactory, and they insisted upon different conditions when the Chartered applied for further powers, and hence the legislation of 1868 and 1869. Mr. Wyatt asks for a justification of the bill we are now called upon to approve. Now, I know enough about the gas supply of London to be able to give him that justification. I know how the demand for gas in London increases in a constantly increasing proportion, and I know that the Commercial Company are in that position that they cannot comply with the contract of 1860, as to the supply of gas, unless they have additional powers. The Commercial Company, amongst all the companies in London, have adhered to the contract of 1860 more than any other. Many companies have gone since that year to Parliament, but the Commercial have put it off from year to year, until they can remain no longer. The justification, therefore, is their desire to supply the public in accordance with the obligations imposed upon them by Parliament, and they cannot do that without an extension of works. That is my opinion, and I believe that opinion is a sound one. As to the Ratcliff Company, one of the shareholders raised a question as to whether they were in an equal position to this company. I can also state that they are so; they are paying their full dividend, at a price below that charged by the Commercial, and therefore the amalgamation of the two companies will certainly not operate to the detriment of the Commercial shareholders. Indeed, I think the two companies are within natural boundaries, and that they ought to be united. I dare say we shall be told that if the Commercial Company want a further supply of gas for their district, there is a ready means of obtaining it, as stated in the Board of Trade letter—viz., that there is the large main of another company passing through the ground where their proposed new station is situated. Now that appears to me as if a neighbour or acquaintance having got into my house in the guise of a friend, being a stronger man than myself, should then throw off his disguise, and being little better than a burgular, attempt to turn me out. So far as I see, the object of a certain company is to compel the Commercial Company to take gas from them in bulk. As to the question respecting the Imperial Company—I need not go into that except to say that I have no doubt if they had offered terms that were satisfactory the directors would have accepted them. As to the revision clauses, I imagine the directors of this company have inserted them in their bill, because they represent the last, and as they may well suppose, the most approved legislation. My own impression is that the revision clauses will not be inserted in the Act. I do not think they have worked satisfactorily, but although they are inserted in the bill, I dare say the directors are prepared to accept the dictum of Parliament.

A SHAREHOLDER: I hope the Gas-Works Clauses Act will not be repealed. It would be most detrimental to our interests. I was not aware that it was contemplated in this bill.

Mr. SAMUDA: Mr. Wyatt has referred to me in the speech that he made, and I think that I can satisfactorily answer all those points which he has called your attention to, and draw a conclusion therefrom that the proposed bill which has been submitted is one that is wholly and entirely in your interests. And first I would say that no person could feel more than we do the advantage of reposing upon the Act of 1860 as long as we could; but the company's business kept on increasing to that extent that it fairly outran the powers that we possess, in our present works, of supplying the district with the additional quantity of gas which we are called upon year by year to give. It was our necessity, and not our wish, that drove us to Parliament for powers to enable us to supply the public demands upon us. Now, let me put one or two things before you, for it is only necessary you should know them; and then, I am sure, you will approve the bill submitted to you. In the first place, it has been accurately stated—but I shall leave it to Mr. Jones to give you the details—that the Ratcliff Company are on an equally good footing with ourselves in every particular, and that we (the shareholders in the Commercial Company) are doing nothing more in this amalgamation, than uniting our forces in joining similar districts, so as to fortify our position in reference to contemplated legislation which is not in our interests, but in the interests of other companies who are attempting to swallow us up.

Mr. WYATT: I beg to deny that.

Mr. SAMUDA: I say that what we have to do is to maintain our identity, and we can only maintain that by being in a position to supply our customers. The moment we say that we have no more power to do so, we are doing the very thing that Mr. Wyatt points to, and other companies will come and swallow us up. I say, therefore, that inopportune as the present time is for going to Parliament—and I quite agree that it is, if we could avoid it—there is nothing but the most straightforward plain sailing in the bill we are about to put before the Legislature, and nothing but what is contemplated in the original Act of our incorporation, now that it has become necessary to enlarge our works. Mr. Wyatt has referred to the fact of our having purchased land for the purpose. That, I maintain, is perfectly legiti-

mate. Our present Act gives us the power to purchase the very land which we have purchased.

Mr. WYATT: Forgive me for asking where it is.

Mr. SAMUDA: Mr. Jones will give you the clause, from which you will see that we have power to purchase 20 additional acres. We possessed 8, and we have purchased another 12. Therefore what we have done is entirely within the powers we possess, and we have in no way committed the shareholders to anything we were not justified in committing them. We now come before you to-day, and we say, "Here we are, a company who have been maintaining their position satisfactorily to the whole of the district boards and other local authorities, and have supplied them with gas at a considerably smaller sum than these gigantic companies who are attempting to swallow up every other company, and we believe it is to the interests of the district we supply that we should maintain our independent position, and that you should enable us to increase our works so as to supply the increased demands that are made upon us." In accordance with that, we put this bill before you, and ask your sanction of it. We say, we hope and believe we shall keep our 10 per cent. just the same as at present. We have been enabled to supply gas at 4s. when other companies have been charging a much larger sum, and therefore we do not see any reason why, if there is so much increase in the demand made upon us as is springing up year by year, we should not, with the same board and the same staff, have the opportunity of doing our business at least as well in the future as we have done hitherto. And then I would simply observe this, that what Mr. Wyatt proposes, and what, at first sight, might appear possible, is quite impossible—*i.e.*, that you should employ the money that it will take to get this bill, in reduction of the price of gas. I think I have pointed out that the only way to get a reduction in the cost of gas is to get this bill, because, unless we get it, we must stand still, as at the present moment; for, though we have bought the land, as we had the power to do, we have not got the power to raise additional capital for the purpose of putting works upon that land. This is, therefore, the reason why the bill is put before you. The Standing Orders of Parliament require that we should submit this matter to you for your approval, and, I trust, after you have heard from Mr. Jones what he has to say by way of supplementing these observations, you will have no hesitation in giving it, and that we shall be fortified in our endeavours to promote a measure which we believe to be entirely in your interests.

Mr. JONES: In addressing myself to the meeting, it must be considered that I am doing so to-day as the engineer of the company, who is most directly responsible for advising the board of directors in all these matters; and I say at once that I have advised the directors that the company are no longer in a position to meet the demands of the district which Parliament assigned to them in 1860. I need not say that this has been confirmed by other engineers who have been consulted on the subject. We are going on and increasing at the rate of 5 per cent. per annum in our consumption, that increase being upon each previous increase; and when I tell you that the increase in our sale of gas for the last 10 years has been from 658 million cubic feet per annum to 931 million cubic feet, and that, during the whole of that time, your capital has remained at £450,000, you will understand something of the necessity for the increase in the capital asked for in this bill. And now that the company are in this most prosperous condition intrinsically, we are not able to meet the increasing demands made upon us by our consumers. This is the reason, and no other, why I have advised the board to go to Parliament. In fact, we cannot go on as we are. One of the previous speakers made an observation to the effect that we ought not to give up the Act of 1860. All I can say is, that, if we had even £20,000 only in the locker, I should advise the directors to hold on as they are. I know that Act was an excellent Act for the proprietors, and we have heard that it was the passing of that Act which induced Mr. Wyatt to invest his money in gas shares. But Mr. Wyatt, and the parishes for whom Mr. Wyatt appeared as parliamentary agent, were not content with it, and they went again to Parliament in 1867 and 1868, and compelled new legislation. And Mr. Wyatt knows that, now that this company are driven to the necessity of going to Parliament for fresh capital, Parliament would not allow them to go back again to the Act of 1860. I wish to goodness we could, but the legislation of 1868 and 1869 has made it imperative for this company to adopt the system then sanctioned. Mr. Wyatt was engaged in connexion with that legislation; I saw him in the committees at that time, and he knows now that he is the agent for another company, and appears here not so much as a proprietor of the Commercial Company as he does as the agent of the large company at Beckton. As I said before, I should be glad if we could still continue under the Act of 1860, but that has now become simply impossible. We must adopt the new legislation, and I have not the slightest doubt that if we get our Act we shall be able—and I speak advisedly on the point—to maintain the dividend we have heretofore been receiving. As regards our amalgamation with the Ratcliff, I must tell you that they are in quite as good a situation to supply their customers as we are; in fact, I may say—perhaps it may be said to be somewhat to my own discredit, but, if so, it is undoubtedly much more to the discredit of the larger companies in the metropolis—that the Ratcliff were enabled to go through last year with a charge of 3s. 9d. for gas, and yet to pay a 10 per cent. dividend. In joining that company, therefore, we are joining a company equally prosperous with our own, and that prosperity will, I believe, attend the united company if we get this bill. I am not, of course, responsible for all the clauses in this bill, nor are the directors, indeed; we are adopting those provisions which we know we shall be compelled to adopt before Parliament, or some other similar provisions. I know that the legislation in reference to the company for whom Mr. Wyatt appears here to-day has been almost a failure. I hope and trust, in our hands, it will be a success. As regards the question of land, I may say that we are holding only 8½ acres, whereas our Act of 1852 gives us power to hold 20 acres, so that we have not exceeded our parliamentary obligations.

Mr. WYATT: Where is the land that you have already acquired?

Mr. JONES: At Bromley.

Mr. WYATT: How far from the existing works?

Mr. JONES: It is within our own district, and, as the crow flies, about a mile and a quarter from the existing works.

Mr. WYATT: I must ask to be allowed to make a personal explanation.

The CHAIRMAN: I must call you to order; you have already spoken.

Mr. WYATT: You have allowed a gentleman to impute personal motives to me, and I ask whether I am not entitled to reply. I am not going to speak upon anything else. (The meeting decided not to hear any further remarks.)

On the motion being put, there were 51 for and 2 only against it, and the chairman declared it carried.

Mr. WYATT: Be kind enough, Mr. Secretary, to record my protest. And here I beg to say that a more unjust accusation than that I am here representing the Chartered Company was never made.

The proceedings terminated with a vote of thanks to the chairman.

LOCAL BOARD WATER-WORKS.—On Thursday last a deputation, consisting of the mayor and other members of the Corporation of Birmingham, waited upon the President of the Local Government Board, to ask that there might be inserted in the measure to be introduced by the president in Parliament a clause enabling municipal corporations and other sanitary authorities to supply water within their jurisdiction, for public and sanitary purposes. The deputation had a long interview with the president, who promised to take the matters laid before him into serious consideration, and thanked his visitors for the many valuable suggestions they had given him

LIVERPOOL GAS SUPPLY.

A Meeting of the Special Committee of the Liverpool Town Council—Dr. CROSS in the chair—was held on the 10th inst., for the consideration of a report by the borough engineer "as to the contract between the gas company and the corporation, and their respective obligations under the Act of Parliament; to what extent, if any, these obligations have not been fulfilled; and what remedies are available to the corporation."

The BOROUGH ENGINEER (Mr. Deacon) reported that, prior to June, 1874, the illuminating power of the gas had been tested in conformity, excepting as regarded the burner, with the provisions of the 10th section of the Liverpool United Gaslight Company's Act, 1865, which ran as follows:—"The gas supplied by the company shall be of the best and purest quality, and shall be such as to produce from a bat's-wing or fishtail burner, consuming 5 cubic feet of gas per hour, a light equal in intensity to the light produced by not less than 20 sperm candles of six to the pound, each burning 120 grains per hour." In the photometer used, the illuminating power of a jet of gas was compared with that of one sperm candle situated at 100 inches therefrom. The results of the testing of the illuminating power of the gas were summed up in a table showing the maximum, minimum, and average illuminating power, as compiled from records in the books of the gas inspector's department, from the year 1857 to the present time. From this table it appeared that in 1865 the average illuminating power was 24·10; that in 1872 it was 18·27; and that in 1873 it had dwindled down to 15·60. In June, last year, the average was 17·07; in July, 15·99; in August, 18·51; and in September—whether, the chairman said, the gas company knew that he was then pursuing his inquiries on the subject or not he could not say—the illuminating power at once jumped up to 21·01; in October it was 20·92; in November, 20·75; in December, 24·25; and in January, this year, it was 26·48. On the 16th of December, 1872, the engineer first reported to the Lighting Sub-Watch Committee a deficiency in the illuminating power of the gas, and he reported, at the same time, the discrepancy in relation to this matter between the provisions of the contract between the corporation and the company and of the Act of 1865. Prior to June, 1874, the illuminating power of the gas consumed in a bat's-wing burner, at the rate of 5 feet an hour, had been deduced from that of the illuminating power of the gas consumed in a bat's-wing burner at 4 feet per hour, on the assumption that the illuminating power was in direct proportion to the quantity consumed. In the case of particular burners employed that supposition was not, however, absolutely correct. The use of the 4-feet burner appeared, so far as the engineer could ascertain, to have originated in the belief that gas, of the quality produced in Liverpool, could not be advantageously burned at the rate of 5 feet an hour. Eight sets of experiments had been conducted for the purpose of determining the relative illuminating power of the 4 and 5 feet burners when consuming the gas recently supplied, the mean results being—5-feet burner, 22·012; 4-feet burner, 20·084. These figures showed that the use of the 4-feet burner must, *cæteris paribus*, have given an illuminating power for the gas lower than that of the 5-feet jet employed by the gas company, and required by the 10th section of the Act of 1865. The method adopted by the corporation up to June, 1874, of obtaining the illuminating power of the gas by means of a 4-feet burner, and calculating therefrom the power of a 5-feet burner, had given a somewhat lower result than would have been obtained by the use of a 5-feet burner, as required by the Liverpool Gas Company's Act, 1865. In no other respect, so far as the engineer could determine, had the recorded tests been materially wanting in accuracy. Only in isolated cases had reports been received of lamps having been extinguished too early or lighted too late. Under the terms of the contract, the company agreed to supply all the lamps with the best and purest gas, the quantity being to each lamp having a bat's-wing burner not less than 4 cubic feet per hour, and in similar proportion to other lamps having others burners." Inasmuch as the price to be paid by the corporation to the company for each lamp having a bat's-wing burner consuming 4 cubic feet of gas per hour was £3 11s. 7d. per annum, and as the corporation had paid this price upon all the lamps, it was incumbent upon the company to supply every lamp with 4 cubic feet of gas per hour. In order to ascertain to what extent this obligation was carried out, the engineer, having communicated with the gas engineer on the subject, caused lamps in various parts of the town to be visited by an officer of the corporation, in company with an officer of the gas company, on the evening of the 15th of December. The pressure of the gas, when burning, was ascertained, and the burner belonging to the lamp was removed, placed in an envelope, labelled, and brought to the engineer; the result being that the average quantity of gas consumed was found to be 3·354 cubic feet per hour, instead of 4 cubic feet. An examination of the burners showed that an undesirable pressure was required to cause them, even when new, to consume 4 cubic feet per hour. So far as the engineer was aware, no official communication had been made to the company on this subject, and he therefore thought it desirable that such a communication should be made. The engineer had tested the gas, both for sulphuretted hydrogen and ammonia. During the last month sulphuretted hydrogen had rarely been present, and never except in extremely small quantities. The presence of ammonia had been detected on some occasions.

The CHAIRMAN said he proposed to prove every one of the points, present them to the council, and let the council take action. In reply to Mr. Picton, he said the points were, the illuminating power of the gas, the deposit account, the accounts of the company for the last 19 years compared with the accounts of other towns, and the price of gas in Liverpool compared with its price in other towns.

On the motion of Mr. BOWER, seconded by Mr. WHITLEY, it was resolved that a copy of the borough engineer's report be forwarded to the gas company, and that they be requested to instruct their engineer to co-operate with the board engineer in testing the quantity of gas consumed by a sufficient number of public lamps to afford a reliable test of the quantity consumed per hour.

YORK UNITED GASLIGHT COMPANY.

The Sixty-First Half-Yearly Meeting of this Company was held on the 4th inst.—Alderman WEATHERLEY in the chair.

Mr. C. SELLERS, the clerk of the company, read the directors report as follows:—

In presenting their report for the past half year, your directors have to state that, although no new extensions of the company's mains have been made, the increase in the consumption of gas, mainly on account of the exceptionally severe winter, has been satisfactory. From the balance-sheet herewith annexed, it will be seen that the usual shareholders dividend has not been earned. The profit upon the half year is £2831, or £1919 short of the required amount. This result your directors fully anticipated when they reduced the price of gas in July last to the comparatively low charge of 3s. per 1000 cubic feet. It will be remembered that in previous reports your directors intimated it was their intention to give back to the gas consumers all available surplus profits, and they now, therefore, propose to make up the deficiency of dividend out of that fund, and so, for the present, continue the existing charge for gas. The efficiency of the company's works has been well maintained, but as the business is now such as to tax portions of the plant to their maximum capacity, your directors are of opinion that some additions will have to be made. It is with much regret that your directors have to announce the death of their esteemed colleague, Mr. James Grayston. He was the senior member of their board, and the directors feel sure that the shareholders will fully sympathise with them in their loss. Your directors recommend that the usual dividend be declared of 5s. per share upon the old shares, and 4s. per share upon the new shares, the same to be paid on and after the 9th inst., free from income-tax.

The statements of account showed the following results:—Sales of fittings, £1449 9s. 10d.; sale of gas, coke, &c., £16,407 17s. 4d.; interest from bankers, £45 15s. 6d.; sundries, £16 6s. The expenditure had been in fittings and fitters wages, £1226 18s. 4d.; coals and lime, £10,362 13s. 10d.; retorts, iron-work, &c.,

£1633 14s. 5d.; salaries and wages, £1725 19s. 8d.; rates and taxes, £223 6s. 11d.; printing, &c., £44 7s. 1d.; law, £16 1s. 10d.; banker's charges, £46 9s. 6d.; direction, £300; discounts and bad debts, £9 5s. 1d. The balance of profit on the half year was £2831 17s. 11d.

The CHAIRMAN, in moving the adoption of the report, said it presented for the consideration of the shareholders various important matters connected with the affairs of the company. The report entered fully into several items with which it would be unnecessary for him to detain the meeting at any length. He might however, remark that during the past half year coals had been selling at a very high price, whereby the lower price at which gas had been sold to consumers had seriously affected the welfare of the company, whose profits had been reduced, as the report stated. To enable the directors to meet the accustomed dividend they had been compelled to go to the reserve-fund, but he believed that before the end of the present contract for coals the cost of that material would be cheaper than at present. Combined with this there would be a greater consumption of gas in the city. He should be glad to answer any questions in connexion with the affairs of the company, but before he moved the adoption of the report he had to allude to one question which was important not only to the board but also to the shareholders. Since they last met in that room they had lost, and he regretted to say it, their friend on the board, Mr. Grayston, who in the report was alluded to as the senior member of the board. By the death of that gentleman the board had lost the services of one of its oldest and most active members, and he was sure that the shareholders at large would join with the directors in expressing their condolence and sympathy with the family in their bereavement.

Mr. J. F. TAYLOR seconded the motion, which was put and carried unanimously.

The CHAIRMAN next proposed a formal motion, that the dividend mentioned in the report be declared.

Mr. TAYLOR also seconded this motion, which was carried unanimously.

Mr. HOLTBY said that he had a resolution to propose of an agreeable character, but before he submitted it he had to ask, as he had done on former occasions with regard to the general policy of the company, the chairman a question of some importance, the answer to which would have some bearing upon the motion he had to submit to the meeting. He should like to know whether the board of directors were unanimous in their views and opinions as regarded offering to the York corporation the sale of the works of the gas company. He had heard it said outside that the directors were not unanimous in opinion on this point, but, however, this might be hoped, that the board would be determined to hold their own on the part of themselves and the shareholders at large. He was sure that they would all approve, and not hesitate to give their full sanction to keeping the company together as at present constituted. For his own part, he might say that he was deadly opposed, and that was a strong remark, to sacrificing the property of the company, and handing it over to the corporation. That municipal body had no claim whatever upon the company, the members of which had united together as a body of adventurers, as their presence in that hall assured them, to furnish the citizens of York with an article they required—gas. The shareholders had advanced and ventured their money in the concern, and therefore it was quite unfair for the corporation, for their own pleasure, to endeavour to take the matter into their own hands, and in this way to compel the shareholders of the company to surrender their property. Such a course of procedure was unfair and uncalled for, as the corporation had no sufficient ground or justification in asking the company to consent to such a scheme. He remembered twelve months ago, at the ordinary meeting, giving some statistics as to the price of gas at other places where the corporations had the supply in their own hands, showing that they were not enabled to supply the article at the same price that was charged to the customers of this city. He quite approved of the sentiments contained in the report, and be entirely agreed with the policy of the directors for the last twelve months. They stated a year ago that they should be enabled to supply gas to the public at a reduced rate, and they had kept their pledge. In their report a year ago the directors said, it would be remembered, at the time they contemplated the raising of the price of gas, that they intimated their intention of applying all available surplus profits to the benefit of the consumers. In accordance with this intimation they had not carried any portion of the profits of the past half year to the depreciation and contingent fund. The directors had been enabled to fulfil their promise, and they were now furnishing gas at 3s. per 1000 feet. But in order to do so, and to keep up the rate of dividend, they had been compelled to go to the reserve-fund to the extent of £1900 odd. Whilst they had kept good faith in maintaining the amount of dividend they had also kept faith with the public as to the charges for gas. He would just allude for a moment or two to some other places as regarded the supply of gas. In Leeds the gas supply was in the hands of the corporation, they having obtained an Act of Parliament for the purpose. The maximum charge for gas was 3s. 9d. per 1000 tor the past half year, but what was the result? It seemed that at Leeds they were much in the same state as at York with respect to the high price of coal, but the corporation had gone to the bad to the extent of something like £20,000. At Glasgow he believed they were to the bad to the amount of about £14,000, although the supply of gas was in the hands of the corporation, who charged 5s. 5d. per 1000 in the midst of a great coal country. What was the cause of this state of things? Common sense told them. It could not be expected that members of corporate bodies would devote their time to the management of these concerns. They could not afford to attend to the supply of gas for the public, for being tradesmen and men of business their time was, to some extent, their capital. In all the reports he had read as to the gas supply at other places he had found that no corporation was enabled to supply the consumers with the same article, of the same quality, and at the same price, as the York Gas Company was doing at the present time. With these remarks he would conclude by asking the chairman whether the directors were unanimous with regard to selling the property of the company to the corporation. A rumour to that effect had gone abroad in the city, and therefore he wished to obtain some information on the subject.

The CHAIRMAN said that he was very much obliged to Mr. Holtby for having put the question, which was one that had not been passed over by the directors. He had been asked the same question before, not more than two months ago. He could state, in answer to Mr. Holtby, that no such subject as that of selling the works of the company to the corporation had ever been entertained by the directors. The fact was, that the subject had never been mentioned since he had been chairman of the company, and no feeling had ever been entertained of disposing of the works. For his own part he could say that he should use his best endeavours to prevent the undertaking going into the hands of the corporation. By keeping the gas-works in the hands of the company, they would save the pockets of the consumers, and, at the same time, the money of the ratepayers.

Mr. HOLTBY said that whilst the charge for gas at York was 3s. per 1000, at Darlington, which was the centre of the coal districts, the charge, he believed, was 4s. 2d. per 1000. Having heard the answer of the chairman to his inquiry, which he considered as very satisfactory, he had pleasure in moving that the best thanks of the meeting be given to the chairman and directors for the efficient manner in which they had conducted the business of the company during the past half year. He moved that the best thanks of the meeting were due to the chairman and board of directors for the efficient and satisfactory manner in which they had conducted the business of the company during the last half year.

Mr. FELTOE, in seconding the motion, said that Mr. Holtby had anticipated him in some remarks that he had intended to offer, and he entirely endorsed all that he had said, believing as he did that the company could not be better managed than by the present board of directors.

Mr. T. P. BULMER supported the resolution, believing that the directors had exercised sound wisdom and prudence in managing the affairs of the company. They were enabled to pay 10 per cent. dividend, which was satisfactory to the shareholders, and the consumers were also satisfied with the price they paid for gas, and the organs of public opinion made no complaint. He was sure that the public were perfectly satisfied as to the manner in which they were supplied by the company with gas, as well they might be when the prices charged were contrasted with those of other towns. He thought that the motives of a few individuals, who had spread reports that the corporation wished to purchase the gas-works, was pretty well understood, and he was glad to see that there was no desire on the part of the directors to dispose of the company's property.

The resolution was carried by acclamation.

The CHAIRMAN briefly returned thanks, and the proceedings then terminated

YORK NEW WATER-WORKS COMPANY.

The Half-Yearly Ordinary Meeting of this Company was held on the 4th inst.—Mr. J. F. TAYLOR in the chair.

Mr. J. P. WOOD read the following report:—

A statement of the accounts for the past half year shows that the revenue of the company continues to exhibit a satisfactory increase. The works of the company are maintained in an efficient state of repair. The directors recommend that a dividend of 7s. per share for the past half year, being at the rate of £7 per centum per annum, be declared, and that the same be paid, without deduction for income-tax, on and after the 9th day of February, 1875. The directors much regret to have to report the death of Thomas Hands, Esq., a director of the company. They have elected in his place, John Smith, of St. Saviourgate, in this city, merchant. The following directors, viz., Mr. James Lancelot Foster, Mr. Robert Varvill, and Mr. John Smith, retire by rotation, and are eligible for re-election. A vacancy having occurred in the office of one of the auditors, in consequence of the resignation of Mr. John Smith, another auditor will have to be elected, and the directors beg to suggest Mr. John Wilson, of Tower Street, York, builder, as a suitable person to fill that office.

The CHAIRMAN, in moving the adoption of the report, said there was a very satisfactory increase of the water-rates, for they had in the past half year reached nearly £5000. There was also the satisfactory item of £31 2s. received for sand. There was a time in the management of that company when all the sand was required for the purposes of filling and levelling up. Turning to the expenditure side there was one item that was rather disappointing to himself personally, as well as to his brother directors, namely, coals. They had hoped that the cost would have been less, but in consequence of the dry time, and then again of the frost setting in in December, they had been obliged to keep their engines going much longer than usual, and had had to consume in the last half year a great many more tons of coal than they had done in the corresponding half of the previous year. He was sorry to say that certain practices of the public were detrimental to the company. One was their allowing their water-taps to run when a frost set in. Of course this drew materially upon the resources of the company, and led to large waste of their stock. It might be a little convenience to those who indulged in the habit, but it was a great drawback to the interests of the company.

Mr. J. L. FOSTER seconded the motion.

Mr. GROVES referred to some buildings which were being erected by other persons than the company near their filtering-beds, and hoped that the directors would see to it that the drainage therefrom did not reach or affect the purity of the water they were supplying to the public. Twelve months before he had asked the directors if they had earned the dividend they then proposed to pay. The reply was that they had more than earned it. He (Mr. Groves) contended that they had not, and he still contended so, and wished to be put right.

The CHAIRMAN said, in reply, the directors would only be too glad to save £200 a year if they but knew how. As to the statement about the earning of the dividend paid twelve months since, he could only say that their profit was £2753, and the dividend came to £2660.

Mr. GROVES contended that they were £75 short of the amount necessary to pay the dividend.

Mr. W. C. ANDERSON said if what Mr. Groves had said were correct he could not see how it detracted from the position of the company.

Mr. FELTOE agreed with the chairman that they were there to discuss present balances, and not to go back to those of twelve months ago. It came to a vote of want of confidence in the directorate to say that a dividend had not been earned. He thought it had been earned, and he expressed his entire confidence in the management.

The report having been adopted, the CHAIRMAN formally moved the payment of a dividend after the rate recommended in it, which was carried.

Mr. J. L. Foster, Mr. R. Varvill, and Mr. John Smith, the directors who retired by rotation, were severally re-elected.

The CHAIRMAN expressed the feeling of regret entertained by the board at the loss which they, in the course of the last half year, had sustained by the death of the late Mr. Hands. He was a most respectable man, and a worthy colleague. He went suddenly, and that made his loss all the more severely felt. His place had been filled by the election of Mr. John Smith. The chairman then moved that Mr. John Wilson be elected the auditor of the company, which was agreed to.

Mr. FELTOE referred to a rumour in reference to the insurance company relinquishing the charge of the fire brigade. If that were carried out, he asked if the board would provide means for furnishing an immediate supply of water by means of hydrants for use in case of fire?

The CHAIRMAN said they were now in correspondence with the corporation in reference to the matter. The supply would be furnished by and at the expense of the water company, as had hitherto been the case.

Mr. W. C. ANDERSON proposed a vote of thanks to the directors. He paid a high compliment as to their efficiency; and as to the apprehension that their water supply was becoming contaminated, said there were three important agencies at work towards its protection. One was the Fisheries Boards, the other the Sanitary Commissioners, and the third the water-works company themselves. By means of this combined action he thought the supply of water should year by year become pure and purer.

Mr. FELTOE seconded the proposition, which was carried.

The CHAIRMAN acknowledged the compliment, and the proceedings concluded.

STOCKTON AND MIDDLESBROUGH WATER-WORKS COMPANY.

The Half-Yearly Meeting of this Company was held at Darlington, on the 2nd inst.—Mr. HENRY PEASE in the chair.

The following report was presented and adopted:—

The accounts for the half year ending 31st of December, 1874, duly examined and certified by the auditors, have been circulated amongst the shareholders, showing an available balance of £13,993 10s. 3d. After payment of all fixed charges, placing the sum of £1000 to reserve-fund, which will then amount to £6000, dividends have been declared on the original and "A" shares, at the rate of 12s. 6d. per share; on the "B" and "D" shares, at the rate of 10s. per share; also a payment towards the arrears of dividends on the original and "A" shares, payable at the National Provincial Bank of England, Darlington, on Friday, the 6th of February, 1875. The condition of the iron trade which has prevailed in the district during the past six months may perhaps have excited in the minds of some shareholders an apprehension as to the profitable working of the company's undertaking, but it should be borne in mind that the consumption of water for domestic purposes must go on, and from this source the company have a reliable and ever progressive income, and hence to a considerable extent the directors have the pleasure of declaring the above dividend. At the special meeting, for which notices have already been sent out, the directors will be prepared to explain their views upon the subject named in the notices, or to give any other information the shareholders may require.

The accounts showed an available balance of £13,993 10s. 3d.

The meeting having been made special,

Mr. DUNN read the heads of the proposed bill.

Mr. GRACE referred to the opposition of the large towns which had been raised against the company's bill, so that they had incurred the very expensive luxury of a parliamentary contest in prospect. Water might be brought from the upper parts of the river by gravitation. He thought it would be better for the company to adopt this plan than pump their water from the Tees.

The CHAIRMAN moved—"That the bill for extending the limits within which the Stockton and Middlesbrough Water Company may supply water, and for empowering them to construct additional works, and to raise additional capital, to alter and amend their existing Acts, and for other purposes, having been laid before this meeting and considered, resolved that the same be and is hereby approved, and that the seal of the company be affixed to the said bill in testimony of such approval." In a speech of some length, he said this question had been before them for some years. The outlay required by the contemplated extension would be about £300,000. The main pipes and their joints would require about one-third of this outlay. He showed that Stockton and Middlesbrough had never been inconvenienced in any way for a supply of water, which caused some surprise to the company that they should have met with opposition from that quarter, especially as more water was required for their increasing manufactures and population. The directors were at a loss to know why they were thus opposed, and he drew a comparison between the care exhibited for a score or two of salmon in the Tees and the health and comfort of the thousands of people who lived in the large Teeside towns. Apparently it had been determined to hold a public meeting against the bill of the company at Stockton—against their own supply of bread and butter. The same remark would in a measure apply to Middlesbrough. He spoke against taking the water by gravitation, as that would involve 40 miles of pipes. They did not say it was not practicable, but did not see their way to do it, and did not advise the shareholders so to spend their capital. If the towns mentioned could find a better supply of water at less price or a larger volume, they were bound to do so. The company, he showed, had yet a very large margin of the stipulated quantity of water which they could pump from the Tees. Whilst the directors could supply water as pure as that which North Yorkshire could produce from its hillsides they were not going to deteriorate their property in the way that it was desired by some to force upon them.

Mr. ROBERT THOMPSON seconded the proposition, which was carried.

After some other formal business the proceedings terminated.

ON THE COMPOSITION AND PHYSIOLOGICAL PROPERTIES OF COAL TAR PRODUCTS.

By M. DUMAS.

[Translated from the *Comptes Rendus* of the Academy of Sciences.]

Coal tar and the products resulting from the manufacture of gas having engaged the attention of a large number of persons who have been occupied in seeking for some suitable method of destroying the *Phyllozera*, it appeared to me that it would not be altogether useless to submit to careful analysis the volatile products of this tar, and to compare their physiological effects.

In the operations conducted with this object I have used tar extracted from the coal of Bességes, upon which the interesting experiments of M. Balbiani were made.

I shall not here enter into the details of my own analysis of the tar, its object being simply, by a first selection, to classify the several products into acids, alkalies, and neutral carburets more or less volatile. The following are the results:—

Composition of Tar extracted from Bességes Coal.

	Per Cent.
Acids or phenols	1·8
Alkaloids	2·5
Liquid oils obtained below 110° C.	1·5
Ditto do. at from 110° to 120°	1·0
Ditto do. do. 120 to 140	1·5
Ditto do. do. 140 to 160	1·4
Ditto do. do. 160 to 180	1·2
Oil partly solid do. 180 to 205	1·7
Concrete products do. 205 to 212	3·6
Ditto do. do. 212 to 220	5·8
Ditto do. do. 220 to 230	3·6
Oil less solid do. 230 to 240	4·4
Solid products do. 240 to 270	4·5
Ditto do. do. 270 to 290	3·1
Ditto do. do. 290 to 330	4·2
Ditto do. do. 330 to 350	3·8
Oily breeze	3·9
Dry breeze	42·2
Water and loss	8·3
	100·0

These results show that benzine existed in this tar in a smaller proportion than is generally found in these kinds of products; it was therefore necessary to seek elsewhere the specific properties attributed to it.

Neither the phenols nor the alkaloids contained in this tar furnished the required explanation. M. Rommier has already shown that although the alkaloids of tar possess the property of destroying insects, no special characteristic attaches to them in this respect, and I have satisfied myself that it is equally the case with the phenols of the tar now under consideration. I therefore instituted a series of experiments with the object of ascertaining the relative insecticidal powers of the more or less volatile hydrocarburets I had obtained from it.

I first of all mixed a portion of these several hydrocarburets with dry sand, each mixture containing 1 per cent. of solid or liquid hydrocarburet. I next placed in a flask, having a capacity of 100 cubic centimètres, a gramme of one of these mixtures, which I covered with a piece of cotton wool. I then introduced two or three moths, and closed the flask immediately.

All the volatile products of coal tar, characterized as neutral carburets, tested in this way, were found to be more or less rapidly destructive of insect life, as will be seen from the following table:—

	Death ensued in
Liquid products boiling below 110° C.	5 min.
Ditto do. at from 110° to 120°	5 to 7 „
Ditto do. do. 120 to 140	5 to 10 „
Ditto do. do. 140 to 160	5 to 10 „
Ditto do. do. 160 to 180	10 to 15 „
Solid products rich in naphthaline, boiling at from 180° to 240° C.	65 or 75* „
Products boiling at from 240° to 270° C.	12 hours.
Ditto do. do. 270° to 350° C.	24 „

All these carburets, therefore, even the less volatile of them, have very powerful insecticidal properties. Those whose action is slowest are very decided in operation. It appears, therefore, that the tar I employed was characterized rather by the presence of naphthaline, or some other of the solid hydrocarburets, and the heavy oils of feeble tension, than by benzine or the light volatile oils.

It may even, perhaps, owe its more marked properties to the feeble volatility of these products, which, by allowing of their long retention in the soil, give them time to furnish the vapours necessary for the destruction of such *Phyllozera* as may have made their way for some distance into the ground. When benzine and volatile oils of a similar character have destroyed all the insects within range of their action, their force is spent, and they evaporate, while being destitute of the power of penetrating the soil to any great depth, they leave nothing behind them to protect the roots of the plants, which are consequently open to renewed attacks from the enemy from which they had been temporarily ridded.

The heavy oils, naphthaline, and the slightly volatile products of tar, do not, however, act in this rapid, transitory, and purely local manner; on the contrary, their operation is slower and more extended, and their effect more durable; they are consequently altogether better suited for the performance of the double duty required of them—viz., the destruction of the insects actually present, and the preservation of the plants from fresh invasions.

It is well known that the heavy oils are now largely used by horticulturists for the destruction of insects; while naphthaline may be usefully employed as a substitute for camphor for the preservation of woollen stuffs, furs, and articles of a like nature.

It nevertheless appeared to me to be necessary, in this respect, to distinguish clearly the action of the naphthaline from that of the carburetted oils accompanying it when it has not been very carefully purified. I therefore submitted to analysis several samples of naphthaline which I had myself previously prepared with very great care, for the purpose of determining the density of its vapour. When tried upon a few moths, it showed itself to possess properties that were decidedly destructive to insects, though somewhat slow in action, the moths remaining for a long time apparently in a state of stupor, but eventually succumbing to the overpowering effects of the poisonous vapour surrounding them.

Of course no one would have the presumption to declare that he had spoken the last word on so complex a subject as the analysis of coal tar, but the foregoing observations justify me in advising steady perseverance in the work of testing in various ways the heavy oils and solid crude carburets of tar mixed with sand or sawdust, more especially as these matters are known to possess insecticidal properties which have already been found in practice to be of great value; moreover, they are not injurious to the roots of the vine, and may be obtained in every gas-works.

It is only by multiplying and varying our experiments that we shall be able to ascertain whether there are actually in existence coal tars containing poisonous properties in variable proportions, and whether any particular combinations of these properties render them specially valuable as insect-destroying agents.

* In the first quarter of an hour, however, the insect was rendered quite motionless.

M. MARTIN'S PROCESS FOR THE PRODUCTION OF ILLUMINATING GAS.

The following details of the specification of the patent taken out by M. Martin for his new process for the production of illuminating gas from peat or wood steeped in naphthaline, are taken from our contemporary *Le Gaz*:—

"In prosecuting our researches upon the value in gas manufacture of the non-crystallizable and liquid hydrocarburets, it occurred to us that a material capable of furnishing a supply of illuminating gas might be prepared with naphthaline.

"As naphthaline has not as yet been employed commercially in gas manufacture, we examined its formula (C_{10} H_8), and in the first place directed our labours to the combination with it of a liquid hydrocarburet, rich in hydrogen, which would decompose at the same degree of heat as the naphthaline itself, with the object of rendering this mixture of hydrocarburets susceptible of absorption by some porous body, which in decomposing would furnish protocarburetted hydrogen.

"This we accomplish by preparing a liquid carburet of hydrogen with heavy petroleum oil, or with any other hydrocarburet decomposing at the same temperature as the naphthaline.

"The operation is conducted as follows:—

"We take 100 kilogrammes (220 lbs.) of the crude naphthaline extracted from the heavy oils obtained in the process of gas manufacture, and liquefy it at a temperature of from 40° to 50° C. To this liquid is added, according to the richness of the gas we wish to produce, from 5 to 25 per cent. of its weight of prepared petroleum oil, or other hydrocarburet decomposing at the same temperature as the naphthaline, in order to ensure assimilation.

"In this mixture, heated to the temperature previously stated, is immersed a certain quantity of peat, or some other porous body capable of furnishing protocarburetted hydrogen, and prepared in such a way as to be able to absorb from 12 to 14 per cent. of the naphthaline. This may be effected either by steeping the peat or other body in the naphthaline itself, or by injecting the liquid under pressure.

"Prepared in this way, the peat or other carburized material will be found to yield, using the ordinary gas apparatus, from 13,500 to 15,000 cubic feet of rich gas per ton of 1000 kilogrammes, with from 250 to 300 kilogrammes of peat coke simultaneously produced; and, according to the richness of the mixture in which the peat has been steeped—in other words, in proportion to the per centage of petroleum oil it contains—we obtain gas of from 7 to 24 candles illuminating power, with a consumption of 3·7 cubic feet per hour.

"Although, as we have remarked, this carburized peat may be employed alone with excellent results, we were desirous of producing a new composition available for the production of gas, and also as a substitute for the Boghead and other cannels which are now employed to enrich ordinary coal gas, but which produce little or no coke. For this purpose we made a mixture composed of

Carburized peat	60 to 70 kilos.
Rich gas coal	30 to 40 „
Lime	1 kilo.

These substances are ground up together with 10 or 12 per cent. of a mixture of coal and wood tar, and, the entire mass being thoroughly worked up, it is compressed by machinery into blocks of any shape required.

"This composition produces from 15,000 to 15,500 cubic feet of gas per ton, which, consumed at the rate of 3·7 feet per hour, gives an illuminating power of from 18 to 20 candles; it also yields about half a ton of a vegeto-mineral coke, which, by its porosity and general composition, forms an excellent substitute for coal for domestic purposes, and for charcoal in those operations where that article is now generally employed. It is unnecessary to add that the quantities of coal and carburized peat employed in the production of this composition may be varied.

"We claim, therefore, as our invention, the novel application or employment of prepared naphthaline in the manufacture of gas, and also the production of a combustible material useful for domestic purposes."

THE BIRMINGHAM GAS COMPANIES.—Special meetings of the proprietors of these companies were held on the 9th inst., for the purpose of considering the bills now before Parliament affecting the future administration of gas affairs in Birmingham. At the meeting of the Birmingham and Staffordshire Company, the chairman, Mr. Heaton, after referring to the agreement for the sale of the undertaking to the corporation, said it had been thought desirable, in the event of any delay in the prosecution of the corporation bill, that the company should promote a bill for raising more capital. At the meeting of the Birmingham Company, Mr. Collins, the chairman, having explained the general position of affairs, said the directors were of opinion that if the corporation bill failed, an amalgamation between the two companies was most desirable, and that additional capital should be raised. At both meetings the respective bills were agreed to.

IRON AND COAL TRADES OF SHEFFIELD, SOUTH YORKSHIRE, AND NORTH DERBYSHIRE.

(FROM OUR OWN CORRESPONDENT.)

The iron trade does not appear to become much stronger as the year grows older, although it seems that in some respects there is already a slight change for the better.

Fuel is gradually growing cheaper and more abundant, and is very likely to remain so, or, indeed, be still more plentiful and lower in price as the weather becomes milder. Raw materials are also easier in many particulars, hence it is apparent that buyers have at present a favourable opportunity for placing their orders in the market, it being exceedingly probable that quotations for many descriptions of iron and ironwork are as low as they can possibly be for at least six months henceforward.

It is stated that the Staveley Iron and Coal Company, near Sheffield, one of the best known concerns in the trade, has been successful (against a number of formidable competitors) in tendering for the manufacture and supply of several thousand tons of large-sized pipes, which are required by a Yorkshire water company. The price is believed to range between the minimum of £6 7s. 6d. and the maximum of £6 15s.; and it is understood that the tenders ran each other very closely indeed. Other of the leading foundry establishments are at present doing a better business than heretofore in builder's ironwork, light castings, and "tubbing," for colliery shafts.

The brassfounders still experience a very active inquiry for all their leading goods and specialities for use in gas and water supplies, as well as engine and general brasses.

Pig iron is easy, and large buyers can very readily obtain an abatement from the following nominal quotations:—No 1 foundry, 64s.; No. 2 foundry, 61s. 6d.; No. 3 foundry, 59s.; No. 4 foundry, 57s.; No. 4 forge, grey, 56s.; No. 5 forge, mottled, 55s.; No. 6 forge, white, 53s.; refined metal, 76s.; Kentledge, 63s.; and cinder pig, 44s. per ton.

The coal trade is quiet, and in some departments dull, owing to the quietude of the leading manufacturing industries. House coal has been in slightly improved request, owing to the lower temperature of the past week.

It is understood that the Sheffield Water-Works Company are about to lay a large main from one of their new reservoirs to a point near the town.

IRON AND COAL TRADES OF SOUTH STAFFORDSHIRE AND EAST WORCESTERSHIRE.

(FROM OUR OWN CORRESPONDENT.)

The announcement made at the usual weekly meeting of ironmasters at Wolverhampton on Wednesday last, that the Pelsall firmes had declared a reduction in the price of their best coals to the extent of 2s. per ton, has considerably disturbed the market, and the general tone of business is much quieter than last reported. Buyers, believing that a general reduction of prices is imminent, appear to be holding back their orders, and the commoner descriptions of coal and iron ore are, in consequence, rather weaker. The statement referred to is thus explained by the Pelsall Coal and Iron Company. "In the early part of last month, during a temporary pressure of the trade, they took the somewhat unusual step of departing from their list, and advancing the price of coal to certain of their customers. The pressure being now over, they have taken off the advance, and returned to their price list, which is based on the standard common to the Pelsall and Cannock districts. There is consequently no real reduction upon the nominal quotations, either at Pelsall or Cannock, nevertheless this partial revision of prices has had a marked effect upon the market, and good manufacturing coal is now offered at 8s. 6d. per ton at the pit, and slack is in abundant supply and pressed for sale. But the price of best coal in the Dudley district, which to a great extent rules the price of iron, is still firm, and there is at present no prospect of a reduction, and the coalmasters plainly indicate that any reduction that may hereafter be declared in prices, will be accompanied by a corresponding movement in the rate of wages.

Finished iron is also firm as regards the leading qualities. Bars range from £10 10s. to £11 12s. 6d., and sheets from £13 upwards. The demand for sheets, plates, and hoops, is well sustained, some fair orders for hoops having lately come to hand on Spanish account. Galvanized roofing sheets are also in good request, but in nearly all other descriptions of finished iron, and especially in the commoner qualities, the demand is weaker. Pig iron is not so firm as lately reported. Hot blast native all-mine is quoted at £5, but cinder pig commands a better inquiry, and is still quoted at £3 5s.

Messrs. Firmstone have decided to blow out two blast furnaces, but an additional one is being lighted by the Chillington Iron Company at Bentley, near Walsall.

A new colliery company has just been formed for the purpose of getting the coal supposed to underlie the Hampstead estate, near Birmingham. The lease embraces 1500 acres, and the capital is £100,000, Lord Calthorpe will be chairman of the board, and the Hon. Augustus Calthorpe one of the directors. The scheme has been well received by the leading coalmasters of this district, and the whole of the capital has already been subscribed privately.

The Wednesbury tube makers are still on strike; £150 has been distributed among the operatives during the past week, and at the various meetings which have been held, resolutions were passed indicating the determination of the men to remain out until the masters withdrew the notice.

THE COAL AND IRON TRADES OF LANCASHIRE.

(FROM OUR OWN CORRESPONDENT.)

Except that there is still some pressure for the better kinds of coal, trade generally is only moderately active. House coal, and good hard coal suitable for forges, meet with a brisk inquiry in the Manchester market, and supplies of the latter description, in some cases, are scarcely up to requirements. For gas coal the season all through has been one of extraordinary activity, and although there is now less pressure than there was, the general demand is still very good, with prices well maintained. The present good demand for house coal has, of course, a tendency to prevent anything like anxiety on the part of colliery proprietors to sell, and for good qualities the prices at the pit mouth range about as under:—Unscreened gas coal, 10s. per ton; gas nuts, 11s. to 12s.; and screened gas coal, 15s. to 16s. per ton. The small quantities of cannel which are sold apart from contracts continue stiff in price. The better classes of engine coal meet with a fair demand, but common stuff is more or less difficult to sell, and there is now some pushing in the market, whilst slack is becoming rather a drug.

The Liverpool market continues very stiff, with a hardening tendency in prices, and were it not that the neighbouring coal-producing districts are in a position to send in good supplies, there is little doubt that quotations would run very high whilst the stoppage of the South Wales collieries last; as it is, sellers are asking high prices, but consumers, except in urgent cases, are cautious about buying at the advanced rates.

In the Wigan district there is a good demand for house fuel and coal suitable for shipping and steam purposes, but common descriptions and slack are not active; and in the St. Helen's district the latter description of coal is exceedingly plentiful, and is now offering at low prices.

Although in some quarters local makers of coke report plenty of demand, the trade generally is quiet. Considerable quantities are offering from other districts at low rates, and prices are scarcely so firm.

The colliers, generally, are reported to be working well, and good supplies are being sent out from the pits.

The railway traffic improves only very slowly, and a committee of colliery proprietors is now engaged collecting the requisite information prior to taking some definite action in the matter.

There is very little change to notice in the iron trade of this district as compared with last week. Business continues exceedingly quiet, and there is very little doing either for early or forward delivery, and this applies both to pig and manufactured iron. Middlesbrough pig iron, delivered in this district, is quoted at 66s. 9d. for No. 3 foundry, 65s. 3d. for No. 4, and 64s. 9d. for No. 4 forge. Lancashire pig iron is without change. Lancashire and Middlesbrough bars, delivered, are quoted at from £8 17s. 6d. to £9 per ton, and rails are the same as last reported.

Founders have not enough work on hand to keep them fully going, and the forges generally are slack.

THE COAL AND GENERAL TRADE OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

The principal feature in connexion with the coal trade of the North of England is the steady demand, for gas coal especially, for immediate delivery. The shipments in the Tyne Dock continue to be upon a pretty considerable scale, and in some instances 12s. 6d. per ton will have had to be paid for ready cargoes. There is a fairly good foreign inquiry, and at this time of the year cargoes are despatched to the West Indies and South America. At the meeting of the North-Eastern Railway Company, held at York on Friday, Mr. George Leeman, chairman, intimated that the directors proposed to expend a considerable sum of money in enlarging this dock, with a view to meet the increased requirements of the coal trade. Household coals have not been in very excessive demand, and the lock-out in the South Wales district has failed to bring a great rush of shipping to load Tyne coal in lieu of Welsh. The fact is, that in the present unsettled state of the labour market in the mining districts, merchants in every part of the world, where they can afford to do it without thoroughly exhausting their stocks, are keeping orders back, and in a sense are "bearing the market." The demand for coke improves; during last week several large cargoes were shipped to Spain. The coke trade is evidently recovering from its depression.

The state of the freight market is favourable to shippers. London rates are lower, and there is no great pressure of business for the bye-ports. Very few goods are being shipped at present; there seems, however, to be more activity in the fire-brick trade, as estimated by the shipments.

The chemical trade of the Tyne is no better. About two-thirds of the men usually employed in the factories of that river are at work, having come to the best arrangement with the employers they could. The other third are out, and are likely to remain so for some time. The strike in the principal iron shipbuilding yards of the Tyne is likely to be obstinate. Neither masters nor men show any disposition to yield.

The iron trade of the North of England is continuing to recover its tone, though extremely slow. No. 3 Cleveland pig iron is quoted at 50s. per ton, and other qualities in proportion. There is a difficulty with the blast-furnace men. Several of the men connected with the factories have accepted the reduction proposed by the masters. Others, however, decline to submit, and are, consequently, under notice to leave their work at the end of a fortnight. There is nothing new in the finished iron trade.

Committees of the Corporations of Newcastle, Gateshead, and North Shields have under consideration the policy of purchasing the respective water-works of those places; but it is very much doubted whether their discussions will come to much.

Eight cargoes of timber, mostly for flooring purposes, were offered for sale by auction, at the Tyne Dock, by a London firm. There was no strong disposition to purchase, but, upon the quantity sold, the prices realized showed that this trade was somewhat improving. Stocks in the North of England are, undoubtedly, lessening in quantity.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

An increasing amount of attention is being given to the Malam system of producing gas, and many persons are becoming convinced that it is to be the system of the immediate future. As a faithful chronicler, it is again my duty to mention one or two interesting facts that have just come under my notice regarding it. First, I should state that one of the magistrates of a thriving town in the West of Scotland has learned, during a visit to Ireland, that Mr. Somerville (whom I formerly mentioned in connexion with the adoption of the Malam system in that country) has succeeded, by that system, in producing gas whose illuminating power is even greater than that obtained by the patentee himself. It seems that Mr. Somerville has attained that result by the adoption of some modification of the apparatus, which has not yet been made public. I have likewise incidentally learned that there is a considerable probability of the Malam system being adopted in the town referred to above. With the view of probably adopting the new system in Maryport, Cumberland, two of the commissioners from that town have lately spent two nights and the better part of two days at Dumfries, in the actual inspection of the system at the inventor's own works. It is believed that they have taken home a very favourable report regarding it.

Owing to the numerous complaints made by parties about the insufficient supply of gas in the Gaberston and Sauchie districts, near Alloa, it is proposed to form a new gas company, for the purpose of supplying the districts in question.

At the meeting of the Perth Corporation Gas Commission, held last Thursday, it was resolved to advance the wages of a number of the firemen and enginemen. This was scarcely to be looked for at this time, considering that the tendency of the price of gas is a downward one. A reduction has actually been made by the gas company of Crieff, a town in the same county. The reduction is not a great one—from 9s. 2d. to 8s. 4d. per 1000 feet—but the gas consumers of Crieff are said to be thankful for even small mercies. It is alleged that the price has always been high in Crieff, when compared with the price in other towns similarly situated; and that fact, together with the circumstance that the gas supplied is of an inferior quality, has given rise to much complaint.

"Is it the duty of the policemen to extinguish street-lamps?" This question has been raised at Galashiels, on account of the Police Commissioners of that town resolving to transfer the duty from the scavengers to the policemen. The inspector of police, who is also the inspector of lighting, issued the necessary instructions, but the men refused to do the work, and were summarily dismissed. One of them subsequently brought an action for damages in the Selkirkshire Small Debt Court, and the sheriff-substitute has now given a deliverance in favour of the complainant, saying that putting out the street-lamps is not a part of the statutory duty of the police force. He has awarded £5 5s. as damages, and expenses.

A propos of the Kilmarnoch Water Bill, now before Parliament, it has been unanimously agreed, at a special meeting of the water company, to limit the time for executing the new works to four instead of seven years. The Town Council had requested that three years should be the limit for the completion of the works. The Inverness Gas and Water Company have just petitioned Parliament against the gas and water bills promoted by the Commissioners of Police. The company object to the bills on several grounds, and on the particular ground that the estimate is insufficient, because it does not include mains and distributing plant. The Town Council of Hamilton, at their meeting last Thursday night, remitted the bill for the extension of the water-works of that town to the Parliamentary Bills Committee, and approved of the principle of the bill.

In connexion with the agitation that has been going on for many months,

with the view of providing a suitable water supply for the town of Irvine, an effort was made to secure the co-operation of no fewer than six other towns—Kilbirnie, Dalry, Kilwinning, Stevenston, Saltcoats, and Kilmarnock; but they have all refused. The Water Commissioners of Kirkcaldy have just increased their supply by adding the water of two copious springs at Balla, and the consumers are getting a daily supply for domestic purposes, amounting to 27·4 gallons per head. The assessment for the domestic supply has been reduced 1d. per £1; still, the total sum raised for water assessment shows no falling off as compared with last year. Messrs. Storrie and Smith, civil engineers, Glasgow, who introduced an excellent water supply into the town of Kirkintilloch last year, have just been engaged to perform a similar good act for the adjoining district of Lennoxtown.

The Works Committee of the Edinburgh and District Water Trust met last Thursday, for the purpose of considering the offers for contract No. 3 of the new works in connexion with the Moorfoot water scheme. The contract is for a built conduit 2902 yards in length, and extending from Gladhouse reservoir to near Edgelaw. There were 13 offers, ranging from £11,000 to £22,000, and that by Mr. Young, Glasgow, for £13,000, was accepted.

There is a somewhat slackened demand for most varieties of coal, and prices have, in many instances, been reduced; but in the gas coal trade business has increased very much, and the deliveries are very considerable.

The price of pig iron warrants has been as low as 72s. 9d. cash during the past week, but on Thursday and on Friday forenoon sellers were asking 73s. 6d. cash. Makers prices have, in some instances, fallen as much as 2s. 6d. to 3s. per ton during the week. A feeling prevails that even lower prices will yet be taken, in order, if possible, to stimulate trade.

Glasgow Water Supply.—With regard to the Loch Katrine water supplied to Glasgow during January, Professor Bischof, of the Andersonian University, reports that it contained very little suspended matter, and was quite free from "previous sewage contamination."

St. Helen's Gas Supply.—At the meeting of the St. Helen's Lighting Committee, on the 10th inst., the town-clerk was instructed to enter into the requisite regulations for ascertaining upon what terms the St. Helen's Gas Company would be willing to sell their works to the corporation.

Reductions in the Price of Gas.—The directors of the Surrey Consumers Gas Company have given notice of a reduction in the price of gas supplied by meter from 4s. 6d. to 4s. 2d. per 1000 cubic feet. At the meeting of the Bromsgrove Gas Consumers Company, on the 4th inst., it was announced that the price would shortly be reduced from 5s. 4d. to 5s.

Bromsgrove Gas Consumers Company.—At the annual meeting of this company, on the 4th inst.—Mr. Jefferies in the chair—a dividend at the rate of 7½ per cent. per annum was declared, and it was resolved to issue 2000 more shares, of £1 each, *pro ratâ* to the existing shareholders, to pay off mortgage bonds, and extend the works. Messrs. Jefferies (chairman), Ward, and Green, retiring directors, were re-elected. W. Gosling, auditor, was also re-elected, and a sum of £10 for extra services was voted to him. The chairman announced that the price of gas to the consumers will shortly be reduced from 5s. 4d. to 5s. per 1000 feet. Votes of thanks were passed to the board of directors and to the auditor, and the meeting then terminated.

Register of New Patents.

APPLICATIONS FOR LETTERS PATENT.

439.—Wirth, F., Frankfort-on-the-Main, Germany, "Improvements in valves." A communication. Feb. 5, 1875.

442.—Stuart, C., Halifax, "Improvements in stop-valves and taps." Feb. 5, 1875.

448.—Pope, R. P., Gray's Inn, London, "Improvements in trapping apparatus for trapping water-closets and other places to prevent the passage of effluvia." Feb. 6, 1875.

468.—Martin, T., Guildford, "Improvements in lamps." Feb. 8, 1875.

477.—Schreebler, G., Guben, Prussia, "Improvements in the construction of pistons for rotary engines and pumps, and of cylinder covers for same." Feb. 9, 1875.

481.—Lee, J. W., Cambridge, "Improvements in rotary pumps." Feb. 9, 1875.

492.—Jones, H. L., Holborn, London, "Improvements in solid and liquid disinfectants and deodorizers." Feb. 10, 1875.

504.—Wier, M. A., Abchurch Lane, London, "Improvements in apparatus for measuring the flow of liquids." Feb. 11, 1875.

507.—Broadfoot, J., Glasgow, "Improvements in water-closets." Feb. 11, 1875.

GRANTS OF PROVISIONAL PROTECTION.

209.—Johnson, J. C., Wednesbury, "Certain improvements in forming strip iron into skelps, and welding the same into tubes applicable for gas, steam, water, or other purposes, and in apparatus employed therefor." Jan. 20, 1875.

289.—Simmons, J., Regent Street, and Morris, J. M., Hanover Street, London, "Improvements in purifying gas for inflating and rendering ascensive balloons and other aërial machines, and in the apparatus employed therein." Jan. 25, 1875.

321.—Taylor, R., Oldham, "Improvements in machinery for tapping screw-threads." Jan. 28, 1875.

323.—Davey, H., Leeds, "Improvements in pumping apparatus worked by hydraulic pressure." Jan. 28, 1875.

326.—Weare, R., and Isherwood, S., Manchester, "An improved carbonaceous material suitable for filtering, deodorizing, and other analogous purposes, and in the apparatus employed in its manufacture." Jan. 28, 1875.

360.—Lambert, C., Hull, "Improvements in filters or apparatus intended chiefly to clear rain water during its flow from roofs to reservoirs." Jan. 30, 1875.

373.—Scott, H. Y. D., Ealing, Middlesex, "Improvements in the manufacture of manures." Feb. 1, 1875.

378.—Buckley, J. B., and Stock, E., Oldham, "Improved double and single sealing stench-traps." Feb. 2, 1875.

396.—Atherton, J., Euston Road, London, "Improvements in joints or couplings for pipes or tubes." Feb. 3, 1875.

NOTICES TO PROCEED.

3577.—Coleman, J. J., Glasgow, "Improvements in the production of volatile liquid hydrocarbons from hydrocarbon gases, and in the apparatus employed therefor." Oct. 17, 1874.

3768.—Holman, S., Laurence Pountney Lane, London, "Improvements in condensers for direct-acting steam pumping and other steam-engines." Oct. 31, 1874.

4271.—Murdoch, H. H., Staple Inn, London, "Improvements in screw-taps." A communication. Dec. 11, 1874.

4403.—Davis, H. T., New Cross, "Improvements in the construction of traps for sinks, drains, and other conduits for water and other fluids." Dec. 22, 1874.

91.—Mackay, G., Edinburgh, "Improvements in purifying liquids, in obtaining or preparing the purifying agents, in recovering, treating, and utilizing matters contained in such liquids, as well as other waste or bye products of manufactures, and in means or apparatus employed therefor." Jan. 11, 1875.

141.—Cave, J. O'C., Weston-super-Mare, "Improvements in the construction of apparatus capable of being employed as an automatic governor or steam-regulator, steam-gauge, safety-valve, and high-steam alarm; and also for regulating the flow or pressure of air, gas, water, and other fluids." Jan. 14, 1875.

NOTICE OF APPLICATION FOR LEAVE TO FILE A DISCLAIMER.

3781.—White, W., Hampstead, London, "Improvements in the precipitation of sewage and other foul waters, and in the preparation of precipitating materials." Nov. 20, 1873.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

2880.—Houghton, J., Salford, "Improvements in the construction of taps or valves." Aug. 21, 1874.

2901.—Knowelden, J., Bermondsey, London, "Improvements in steam, water, or other fluid engines." Aug. 25, 1874.

2911.—Ley, W., and Shearer, G., Liverpool, "An improved tube-plug or stopper." Aug. 26, 1874.

2952.—Lotz, W. F., Carter Lane, London, "Improvements in the method and means of suspending chandeliers for gas or other lights, and adjusting them to the required height." A communication. Aug. 29, 1874.

2989.—Foster, J. K. J., Horbury, Yorks, "Improved apparatus for extinguishing fire, applicable also for distributing water for other purposes." Sept. 1, 1874.

3735.—Tylor, A., Newgate Street, London, "Improvements in water-closets, lavatories, and other apparatus relating to sanitary arrangements and the parts connected therewith; also in the cocks, valves, ball or float valves, hydrants, and apparatus for containing, measuring, controlling, regulating, and arresting the water supply of the same, and for other purposes." Oct. 29, 1874.

3778.—Turton, S., Jolley, W., and Birchall, J. T., Heaton Norris, Lancs, "Improvements in diminishing valves or apparatus for regulating the pressure of liquids and fluids." Nov. 2, 1874.

3784.—Vallé, B. H., Stow-on-the-Wold, "Improvements in the treatment and utilization of sewage, and in means employed therein." Nov. 3, 1874.

3792.—Fogarty, T. B., Warren, Massachusetts, U.S.A., "Improved apparatus for carburetting air or other gaseous bodies." Nov. 3, 1874.

3988.—Walker, W. T., Highgate, London, "Improvements in the construction of gas-purifiers." Nov. 20, 1874.

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION has been AWARDED to

GWYNNE & BEALE'S PATENT IMPROVED GAS-EXHAUSTERS,

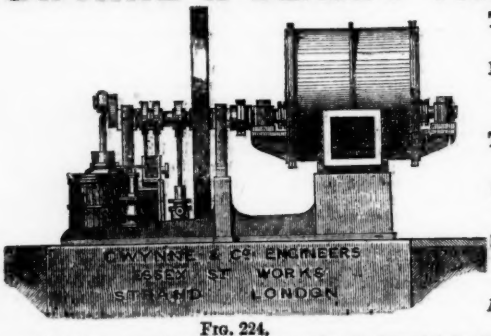


Fig. 224.

The BEST EXHAUSTERS IN THE WORLD.

Made under the personal superintendence of

Mr. BEALE,

The oldest Maker, Inventor and Patentee of

GAS-EXHAUSTING MACHINERY.

(It is NOT CORRECT to state that Mr. BEALE has RETIRED.)

Prices and every information on application.

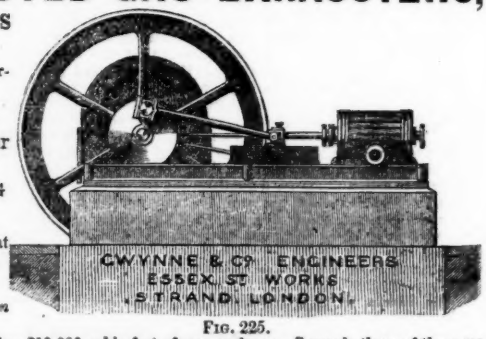


Fig. 225.

Fig. 224 represents one of those erected at the Imperial Gas-Works, Bromley, capable of passing 210,000 cubic feet of gas per hour. Several others of the same size are now on order for the same Company. These Patent Machines combine the highest quality of workmanship and materials, the largest bearings and wearing surfaces, with the **most perfect system of action yet discovered.** Fig. 225 represents one of a series of four at the Nottingham Gas-Works, each passing 52,500 cubic feet per hour. Gwynne and Co. *do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, but to produce Machinery of the very highest quality, and the most approved design and arrangement.* Their prices have been estimated with a due regard to the **excellence of the article produced,** and when this is taken into consideration, they have no fear for the result. The orders executed this season for Exhausters and alterations to their patented system amount to over 4,000,000 cubic feet of gas passed per hour, and to over 300 horse power for Engines to drive them. In every instance their work is giving the greatest satisfaction. Numerous testimonials and references can be given.

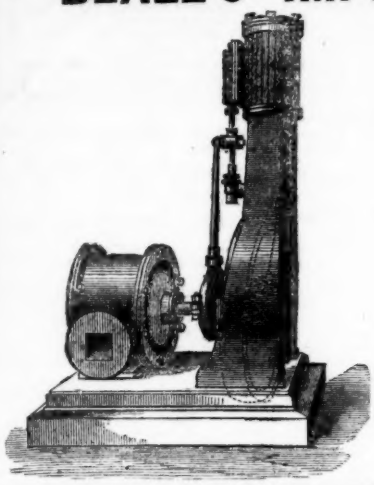
REGULATORS, BYE-PASSES, STOP-VALVES, GAS-VALVES, & MACHINERY FOR GAS MANUFACTURE, OF ALL SIZES,

CAN BE HAD ON APPLICATION TO

GWYNNE & CO., HYDRAULIC & GAS ENGINEERS, ESSEX STREET WORKS, STRAND, LONDON, W.C.

G. & Co. are now manufacturing for a London Gas Company three of their 210,000 *cubic feet Patent Gas Exhausters, and many of all sizes.*

BEALE'S IMPROVED PATENT GAS-EXHAUSTER



WITH

ENGINE COMBINED

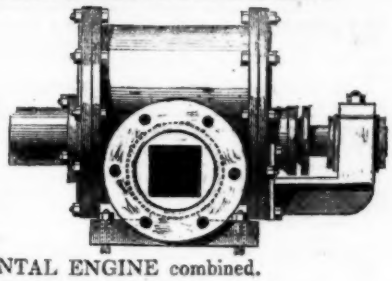
ON

ONE BASE PLATE.

SOLE MAKERS,

GEORGE WALLER & CO.,

Who, since Mr. BEALE'S retirement, are the Oldest Makers.



EXHAUSTERS with HORIZONTAL ENGINE combined.
EXHAUSTERS with OUTSIDE BEARINGS.
MAKERS of ENGINES, BOILERS, and GAS MACHINERY.
TAR, LIQUOR, and SYPHON PUMPS. GAS-VALVES in stock, 2 to 30 inches.
SELF-ACTING BYE-PASS VALVES, with Lid and Relieving Lever.
MANN'S and many other descriptions of WATER DISTRIBUTORS.
SCRUBBERS, PURIFIERS, and CONDENSERS.
EXHAUSTERS from 3000 to 60,000, new and second hand, in stock.

PHŒNIX ENGINEERING WORKS, HOLLAND STREET, S.E., & at STROUD, GLOUCESTERSHIRE.

J. T. B. PORTER AND CO.,

ENGINEERS AND CONTRACTORS,

LINCOLN, AND 1, WESTMINSTER CHAMBERS, LONDON, S.W.,

Beg respectfully to remind Gas Companies and Corporations that they continue to manufacture and supply every description of Apparatus connected with the

MANUFACTURE OF GAS AND ITS DISTRIBUTION.

GASHOLDERS, PURIFIERS, SCRUBBERS, CONDENSERS, RETORTS, &c., &c.

PLANS, SPECIFICATIONS, AND ESTIMATES FOR WORKS OF ANY SIZE.

REFERENCES TO MORE THAN 500 WORKS ALREADY ERECTED.

PROSPECTUSES AND TESTIMONIALS ON APPLICATION.

MESSRS. JOHN BETHELL & CO.,

(ESTABLISHED 1838,)

CONTRACTORS for GAS TAR,

MAKERS OF ANTHRACENE, CREOSOTE, &c.,

CLAYTON CHEMICAL WORKS, MANCHESTER;

SWAN VILLAGE, WEST BROMWICH.

Head Offices: 38, KING WILLIAM STREET, LONDON BRIDGE.

JAMES MILNE & SON,

GAS ENGINEERS,

Gas-Meter, Gas Apparatus, and Gas-Fittings Manufacturers,

EDINBURGH, AND

2, KING EDWARD STREET,

NEWGATE STREET, LONDON.

Meter Works in London—2, CROSS STREET, WILDERNESS ROW, E.C.

STATION-METERS, GOVERNORS, CONSUMERS METERS, GAS LUSTRES, CHANDELIERS, BRACKETS, &c.,

And every description of Gas-Fittings and Gas Apparatus.

WANTED, in a Gas Engineer's and Contractor's office, a thoroughly competent CLERK to superintend estimates, &c. Salary to commence at 100 guineas.

Full particulars, prepaid, to Messrs. WILLIAM BLEWS AND SONS, BIRMINGHAM.

WANTED, Travellers on Commission, to offer to Gas Companies a Patent Purifying Material. Six years in use at some of the largest Gas-Works in the kingdom.

Address No. 133, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO GAS-FITTERS.

WANTED immediately, by the Neath Gas Company, an efficient Man as GAS-FITTER, Meter Inspector, and Main and Service Layer. Wages 27s. per week, with house, coals, and gas. Preference would be given to a man having knowledge of ordinary smith's work.

Application, stating age, &c., to be forwarded, on or before Monday, the 22nd inst., to C. STAFFORD ELLERY, Manager.

YSTRAD GAS AND WATER COMPANY, RHONDDA VALLEY, GLAMORGANSHIRE.

WANTED, by the above Company, TENDERS for PIPE-LAYING, from Ystrad Bridge to Penygraig (about 4 miles).

For particulars apply to C. Henry James, Esq., Engineer, 8, Courtland Terrace, Merthyr Tydfil.

Tenders to be sent in, marked "Tenders for Pipe-Laying," to the Secretary, Mr. FRANK JAMES, 134, High Street, MERTHYR TYDFIL, on or before the 8th of March, 1875.

For Companies to issue to their Gas Consumers.

ADVANTAGES OF GAS

FOR

COOKING AND HEATING.

(NEW EDITION.)

By MAGNUS OHREN, A.I.C.E., F.C.S.

Specimen Copy by post Threepence, direct from MAGNUS OHREN, Gas-Works, Lower Sydenham, London, S.E.

WANTED, Two good second-hand Purifiers, to be not less than 14 ft. square.
State where to be seen, price, &c., to Mr. LONGWORTH, Dukinfield, MANCHESTER.

WANTED, a Set of second-hand Purifiers, with necessary valves and connexions. Must be in good order and cheap, and not less than 7 ft. square.
Apply, with particulars, to GAS COMPANY, Northallerton, YORKSHIRE.

WANTED, by the Advertiser, a steady Man, aged 27, a situation as MANAGER of a Gas-Work. Can do all that is required on the works. Understands the working and setting of clay retorts, exhauster, &c., and can keep accounts, if necessary. Can supply good character and testimonials.
Address F. B., Gas-Works, Watlington, OXON.

WANTED, a Foreman for a Gas-Work where the make is about 25 million cubic feet per annum. Will have to look after the engine and exhauster, and make himself generally useful. One who can do smith's work preferred.
Address, stating age, wages required, and references, &c., to No. 134, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, an engagement as Assistant MANAGER, or Superintendent of a Gas-Work, by one who has received an Engineer's and Chemical Education. Thoroughly understands the manufacture and distribution of gas, having held the same post before on large and small works.
Address No. 132, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FORFAR GAS-WORKS.

WANTED, by the Forfar Gas Corporation, a competent and experienced GAS MANAGER, to take charge of the above works, the present make of which is about 17,000,000 cubic feet of gas per annum. The duties include the making out and collecting of the accounts for gas-rates and others. Salary to commence with £110 per annum, with house, coal and gas, and all taxes paid. The house is comparatively new and most commodious. Security and immediate entry will be required.
Applications, with testimonials, endorsed "Manager," to be lodged with WILLIAM GORDON, Solicitor, Clerk to the Corporation, on or before Thursday, the 18th of February current.
Forfar, Feb. 3, 1875.

FOR SALE, in good condition, three 20-light WET METERS, and six 10-light Wet Meters. No reasonable offer refused.
Apply to Mr. S. DAWES, Gas-Works, CLEVEDON.

FOR SALE—Two Boilers, each 18 ft. by 6 ft. by 3 ft. flue, with steam-valves, safety-valves, urnace-bars, and lids complete, by Thompson, Highfield, Bilston.
One Boiler by Piggott, 13 ft. by 4 ft. 6 in., with flue 2 ft. 3 in. diameter.
One Plain Boiler, 8 ft. by 3 ft., without flue.
One 16-h.p. Horizontal Engine, 12-in. cylinder, 30-in. stroke, complete, with fly-wheel 8 ft. 6 in. diameter.
One set of 10-in. Pumps, with working barrel, bucket, and clack, and 30 ft. to 40 ft. flanged suction-pipe.
One 8-in. Pump, with flanged suction-pipe.
One "Jones's" Exhauster (100,000 per hour), with flanged casting for connexions, and four 2-ft. slide-valves.
Also four 18-in. Slide-Valves.
Six 12-in. "
Two 14-in. "
One 10-in. "
Two 24-in. Walker's Valves.
One Double 4-in. Steam-Valve.
May be seen, and further information obtained, on application to the MANAGER, at the Gas-Works, Saltley, BIRMINGHAM.

TO GAS APPARATUS MANUFACTURERS AND OTHERS.

TO BE DISPOSED OF, the Rights and Privileges granted under Letters Patent to Mr. W. Box for his "Anti-Dip Valve;" also similar Rights and Privileges, under Letters Patent, for his "Ascension-Pipe Joints." These valuable Inventions may be acquired at a very moderate sum, or the Patentee would be happy to enter into an arrangement with a manufacturer for making and introducing the articles upon mutually advantageous terms.
Address Mr. W. H. BENNETT, 42, Parliament Street, WESTMINSTER, S.W.

MERTHYR TYDFIL GAS-WORKS.

RETORT MOUTHPIECES, ASCENSION, ARCH, AND DIP PIPES, HYDRAULIC MAIN, &c., &c.

TO BE DISPOSED OF, at a low price, a number of 15-in. diameter, with 5-in. outlet-sockets, Round Retort Mouthpieces, complete, with wrought-iron lids, cross bars, and screws, &c., and 5-in. by 4-in Ascension, Arch, and Dip-Pipes. Also several lengths of 16-in. by 14-in. U-shape Hydraulic Main. All the castings, &c., were obtained from Messrs. Newton, Chambers, and Co., Thorncliffe Iron-Works, and are in good and clean condition.
For price and further particulars apply to the undersigned.
JOHN LEES COCKER, Manager and Secretary.
Gas Offices, Merthyr Tydfil, Feb. 15, 1875.

LOUGHBOROUGH GAS COMPANY.

THE Directors invite Tenders for the purchase of the GAS TAR and AMMONIACAL LIQUOR manufactured at their works, in quantity per year of about 180 tons of Tar and 250 tons of Ammonia Water (6° Twaddel), for a term not exceeding Two years, from the 1st of July next.
The Tar and Water will be pumped by the Company into an elevated tank for convenience of loading.
Tenders to be at a price per ton of 2240 lbs. in each case, and payment to be made seven days after each quarter-day.
Tenders to be addressed to me not later than the 27th of the present month.
J. B. BALL, Engineer and Manager.

THE Directors of the Wareham Gas and Coke Company are prepared to receive TENDERS for the supply of (say) 100 tons of Pelaw Main, North Pelton, or New Pelton GAS COALS (best quality), to be delivered, free of charge, into lighters at Russell Quay, not later than the first week in April next.
Payment will be made for the same two months from the time of delivery.
Tenders to be sent to my Office on or before the 1st of March next. F. FILLITER, Secretary.
Wareham, Dorset.

THE Gas Committee of the Stockton Corporation are prepared to receive TENDERS for the excavation and construction of a GASHOLDER-TANK, 122 ft. diameter and 26 ft. 6 in. deep.
The plans and specification may be seen, and further particulars obtained, at the Office of the Gas Engineer to the Corporation, Gas-Works, Stockton-on-Tees.
Tenders, sealed and endorsed "Gasholder-Tank," to be sent in to H. G. FABER, Esq., Town-Clerk, STOCKTON-ON-TEES, not later than the 1st of March, 1875.
The Gas Committee do not bind themselves to accept the lowest or any tender.

TO PIPE-FOUNDERS.

THE Gas Management Committee of the Hereford Corporation require TENDERS for the supply of about 130 tons of Cast-Iron PIPES, with turned and bored spigot and socket joints. To be delivered free at the Hereford Railway Station or Canal Wharf.
Specification and conditions may be obtained on application to the undersigned.
Tenders, endorsed "Tender for Pipes," to be addressed to the Chairman of the Gas-Works Management Committee, Gas-Works, Hereford, and delivered not later than Ten o'clock a.m., on Tuesday, the 9th day of March.
The Committee do not bind themselves to accept the lowest or any tender.
WILLIAM DAVIS, Engineer.
Gas-Works, Hereford, Feb. 1, 1875.

THE Local Board for the district of Atherton, Lancashire, are prepared to receive TENDERS for the supply, fixing, and completing of Four Dry Lime PURIFIERS, each 12 ft. square by 4 ft. 6 in. deep, with 12-in. connexion-pipes, dry centre-valve, and lifting apparatus.
Also Two Wrought-Iron SCRUBBERS, 18 ft. high by 5 ft. diameter, with 12-in. inlet and outlet connexion-pipes complete.
Drawings and specifications may be seen at the Gas-Works, Atherton, on application to the undersigned.
Sealed tenders for the above, together or separately, and endorsed "Tender for Purifiers, &c.," may be delivered to me not later than Friday, the 26th day of February instant.
No allowance for tenders, nor do the Board bind themselves to accept the lowest or any tender.
By order,
DANIEL SCHOFIELD, Clerk.
Atherton, near Manchester, Feb. 6, 1875.

BIRMINGHAM GASLIGHT & COKE COMPANY.

THE Directors invite Tenders for the purchase of the GAS TAR produced at their Works, in quantity about 5000 tons per annum, for a term not exceeding Three years from the 1st of July next.
The Tar will be delivered free into the purchaser's boats at the Company's Works.
Tenders, which must be at a price per gallon, or per ton of 200 gallons, for monthly cash payments, to be delivered to the Secretary not later than Wednesday, the 24th of February next, endorsed "Tenders for Gas Tar."
The Directors do not bind themselves to accept the highest or any Tender, and may require reasonable security for due fulfilment of the Contract.
Any further information may be obtained on application to the Chief Engineer, Mr. Charles Hunt, at the Gas-Works, Windsor Street.
By order of the Directors,
JOSEPH SLOCOMBE, Secretary.
Offices: 23, Union Street, Birmingham,
Jan. 18, 1875.

WALLASEY GAS-WORKS.

TO IRONFOUNDERS AND OTHERS.

THE Wallasey Local Board are prepared to receive TENDERS for a quantity of 15-inch GAS MAIN-PIPES.
Duplicate specification, and schedule of quantities, may be had on application to the Engineer, E. H. Harris, Esq., at his Office at the Gas-Works, Great Float, near Birkenhead.
The Contractor will be required to enter into a bond, with approved sureties, for the due performance of the contract, which contract and bond will be prepared at the expense of the Contractor.
Sealed tenders, addressed to the Chairman of the Gas and Water Committee, and endorsed "Tender for Pipes," to be left at my Office, Church Street, Egremont, near Birkenhead, before Three o'clock in the afternoon of Monday, the 22nd inst.
The Board do not bind themselves to accept the lowest or any tender. By order,
T. SOMERVILLE JONES, Clerk to the Board.
Public Office, Egremont, Feb. 10, 1875.

YSTRAD GAS AND WATER COMPANY.

No. 2 GAS STATION.
CONTRACT FOR THE ERECTION OF WORKS, &c.

THE above Company solicit Tenders for work to be done in the erection of GAS-WORKS, near Porth, Rhondda Valley, Glamorganshire.
Contract No. 1 comprises the excavation, brickwork, &c., of a Gasholder-Tank, 62 ft. in diameter, with Gasholder to work therein; the erection of Boundary Walls, and of all buildings; and the supply and fixing of all the Apparatus, with 6 and 8 in. Connexions, requisite in the construction of such Gas-Works.
Contract No. 3.—Laying about 11,000 yards of Street Mains.
Full particulars may be obtained, and inspection of the plans and specifications, after the 20th inst., on application to the Company's Engineer, Mr. John Lees Cocker, Gas-Works, Merthyr Tydfil.
Sealed tenders to be forwarded to the undersigned, endorsed with the No. of the Contract, not later than Monday, the 8th day of March next.
The Directors do not bind themselves to accept the lowest or any tender. By order,
FRANK JAMES, Secretary.
134, High Street, Merthyr Tydfil, Feb. 15, 1875.

BARNET DISTRICT GAS AND WATER COMPANY.

NOTICE is hereby given that the ORDINARY HALF-YEARLY GENERAL MEETING of the STOCK AND SHARE HOLDERS of the above Company will be held at the London Tavern, Bishopsgate Street, in the City of London, on THURSDAY the 25th day of February inst., at Two o'clock in the afternoon precisely, to receive the Report of the Directors and the Accounts for the half year ending the 31st day of December last, to declare a Dividend, to elect Directors and an Auditor, to fix the remuneration of the Directors and Auditors, and to transact the general business of the Company.
The Transfer Books will be closed from the 11th to the 25th inst., both inclusive.
By order of the Board.
Offices, 60, Cornhill, London, Feb. 5, 1875.

TO GASHOLDER MAKERS.

THE Directors of the Imperial Gaslight and Coke Company, London, are prepared to receive TENDERS for a large Double-Lift GASHOLDER, 200 ft. diameter, to be erected at their works, Bromley-by-Bow, Middlesex.
All *bonâ fide* Gasholder Manufacturers, intending to send in tenders, may see the drawings and specification, and copy the same on application, to Mr. T. N. Kirkham, the Company's Engineer-in-Chief, at this Office.
Sealed tenders, endorsed "Tender for Gasholder," must be sent to the undersigned not later than Friday, the 5th of March next.
It is to be distinctly understood that the Directors do not bind themselves to accept the lowest or any tender.
HARRY CHUBB, Secretary.
33, John Street, Bedford Row, London,
Feb. 13, 1875.

Just published, price 10s. 6d.,

REGISTRATION OF DISTRIBUTORY PLANT.

The forms for this purpose are to illustrate the Paper on Distribution of Gas, read at the Edinburgh Meeting of the British Association of Gas Managers. By the use of the synopsis the whole of the out-door plant may at once be seen, with all matters pertaining to the same.
W. J. WARNER, Engineer.
South Shields.

BAILEY'S Patented Inventions are now in extensive use wherever steam is known. Bailey's Patent Steam Gauges, Pyrometers, Water Gauge Cocks, Test Pumps, Fusible Plugs, Steam and Water Valves, Safety Valves, Junction Valves, Pumps, Tell-Tales, Recorders, Lightning Conductors, Electric Telegraphs, Turret Clocks, Steam Joint Cement, Lifting Jacks, Boiler Feeders, Lime Catcher and Separator, Injectors and Ejectors, and every description of first-class Brass Work for Engines and Boilers. Gas-Works Managers who have not our large book should send for it.

16th edition, 1000 engravings, 4to., post free 2s. in stamps, weight 10 oz., cost of production £1000,

BAILEY'S Illustrated Inventions, containing details and prices of goods in our five several departments:—(1) Brass Foundry, Steam Gauges, Indicators, Feeders, and Fittings; (2) Engineers Sundries, Small Tools, and Stores; (3) Machine Pump and Fire Engine; (4) Turret Clock, &c.; (5) Electric Telegraph, A B C Instruments, Bells, and Apparatus.
J. BAILEY and Co., Albion Works, Salford, LANCASHIRE.

Mr. ALFRED LASS,
60, CORNHILL, LONDON, E.C.,
Is prepared to open the Books, and, if necessary, keep the Accounts of Gas and Water Companies.
To examine the Books and Accounts, and prepare Balance-Sheets for the information of Directors.
To assist Secretaries in preparing Balance-Sheets, according to the "Gas-Works Clauses Act, 1871;" or may be consulted with respect to Accounts generally.

WM. RICHARDS,
INVENTOR OF THE DRY GAS-METER,
REVISER OF "HUGHES ON GAS-WORKS,"
CONSULTING GAS ENGINEER,
Advises on all matters of business connected with Gas lighting. Furnishes Working Drawings of Retort-Settings, specification of Works, complete or in detail.
17, BURTON ROAD, BRIXTON, LONDON, S.W.

GAS COMPANIES ACCOUNTS.

EDWARD SANDELL,
PUBLIC ACCOUNTANT,
The Projector of the Gas Companies Analyzed Expenditure Account Book, having had twenty years experience in opening, keeping, auditing, and investigating Gas Companies Accounts, offers his services for similar purposes, and also in preparing Financial and Statistical Accounts for Arbitrations or Parliamentary Applications. References to numerous Gas Companies and the most eminent Consulting Gas Engineers.
4, Skinner's Place, Queen Victoria Street, LONDON.

GARSIDE'S IMPROVED REGISTERED TUBE-VICE, holds all sizes of Wrought-Iron and Brass Tubes, from a 2-in. socket to the smallest brass tube made.

GARSIDES IMPROVED MAIN DRILLING CLIP, made in two sizes, to drill from 2-in. to 6-in. Mains, and from 6-in. to 12-in. Mains.
The above tools are made light and handy.
For drawings, &c., apply to the maker, SAMUEL GARSIDE, Gatefield Iron-Works, ASHTON-UNDER-LYNE.

PATENT FUEL AND LIME FOR PURIFYING FROM FOUL LIME.
By a simple process the Foul Lime is converted into Fuel, by the combustion of which the lime is reproduced as a purifying agent.
Licences to work the invention will be granted to Gas Companies on very reasonable terms.
For further particulars apply to Mr. E. MADDOCKS, Manager of the Gas-Works, KETTERING.
The adoption of the above invention, without a licence from the Patentee, will be an infringement of the patent, and will subject the person or company guilty of such infringement to legal process.

J. & J. BRADDOCK,

GAS ENGINEERS,

GLOBE METER-WORKS, OLDHAM,

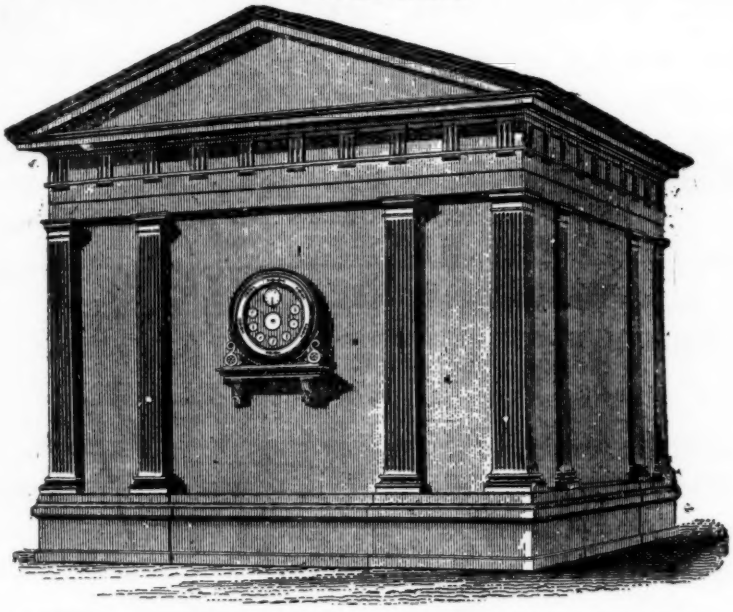
MANUFACTURERS OF

WET & DRY CONSUMERS GAS-METERS

OF THE HIGHEST EXCELLENCE;

ROUND STATION-METERS,

ON CAST-IRON STANDS.



SQUARE STATION-METERS,

WITH PLANED JOINTS.

GOVERNORS, GAUGES, INDICATORS, MAIN COCKS, &c.

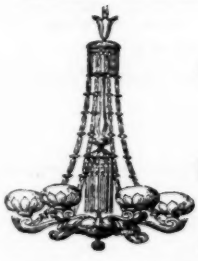
GAS COOKING APPARATUS.

Home and Foreign Orders promptly attended to.

All Sizes of CONSUMERS METERS, STATION-METERS, and GOVERNORS generally in Stock.

Orders almost invariably despatched on the day of receipt.

TERMS, &c., ON APPLICATION.



F. & C. OSLER,

45, OXFORD STREET, LONDON, W.

MANUFACTORY AND SHOW-ROOMS:

BROAD STREET, BIRMINGHAM.

ESTABLISHED 1807.

MANUFACTURERS OF CRYSTAL GLASS CHANDELIERS,

WALL LIGHTS, AND LUSTRES FOR GAS AND CANDLES.

TABLE GLASS OF ALL KINDS.

CHANDELIERS IN BRONZE AND ORMOLU. MODERATOR LAMPS.

GEORGE ANDERSON,

GAS AND CONSULTING ENGINEER,

4, CANNON ROW, PARLIAMENT STREET, S.W.

MR. ANDERSON advises Companies on all matters connected with the manufacture of Gas and the construction of Works.

PATENTEE and MANUFACTURER of the following Inventions:—

RETORT SETTINGS, heated by tar without the production of smoke.

STEAM-ENGINES and EXHAUSTERS, separately or combined.

FOUR-WAY VALVES, one of which is equal to three ordinary Valves.

STATION GOVERNORS—the Gasholder cannot tilt and cause accident.

BREEZE AND TAR FUEL MACHINE.

A Pamphlet containing Eighteen Illustrations of the foregoing, with letterpress on the construction of Works, post free, 2s. 6d.

N.B.—The second edition of this Work, *now ready*, contains Illustrations of the Machine for converting Breeze and Tar into Fuel for heating the Retorts.

"The Author is well qualified to speak authoritatively upon the important subjects to which his pamphlet refers."—*Artizan.*

ADDISON POTTER,

WILLINGTON QUAY,

NEAR NEWCASTLE-UPON-TYNE,

Manufacturer of

CLAY RETORTS, FIRE-BRICKS, AND EVERY DESCRIPTION OF FIRE-CLAY GOODS

THOMAS CARR & SON,

MANUFACTURERS OF

FIRE-BRICKS, LUMPS, TILES, RETORTS, &c., &c.,

SCOTSWOOD FIRE-BRICK WORKS,

NEAR

BLAYDON-ON-TYNE.

EMILY GIBBONS,

Dibdale Fire-Clay Works & Colliery,

Near STOURBRIDGE.

(ESTABLISHED 1834.)

MANUFACTURER OF EVERY DESCRIPTION OF

Burs, Lumps, Stays, Shields, Blast Furnace and other Bricks & GAS-RETORTS.

Red and Blue Clay Goods, Engineering and other Ironwork, and Fittings supplied.

N.B.—Above works having been recently enlarged, orders of any magnitude for HOME or EXPORT Trade will receive immediate attention.

C. & W. WALKER'S

WOOD PURIFIER SIEVES,

Which have now been used for twelve years, and their advantages and durability fully established. They are made entirely by steam machinery in very large quantities at the most moderate cost.

MIDLAND IRON-WORKS,

DONNINGTON, NEAR NEWPORT, SHROPSHIRE;

8, FINSBURY CIRCUS, LONDON.

TROTTER, HAINES, & CORBETT,

BRETTELL'S ESTATE

FIRE CLAY & BRICK WORKS,

STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASS-HOUSE FURNACE & BLAST-FURNACE BRICKS LUMPS, TILES, and every description of FIRE-BRICK.

Proprietors of

BEST GLASS-HOUSE POT and CRUCIBLE CLAYS.

Successors to

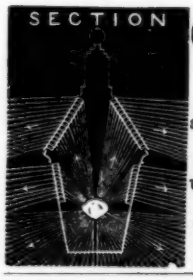
E. BAKER AND CO., LATE BRIERLEY HILL, STAFFORDSHIRE.

CLOTH GAS-BAGS FOR MAINS.

As supplied to the Imperial, Chartered, and other London and Provincial Gas Companies. Bellows and Valves for inflating Well Dresses, Stokers Gloves, India-Rubber Suction and Delivery Hose, Gas-Tubing, Leather India-Rubber and Gutta-Percha Machine-Bands, Sheet and Washers and Steam Joints.

T. BUGDEN, Manufacturer,

79, GOSWELL ROAD, LONDON, E.C.



THE PATENT

CATOPTRIC LAMP

Is now in use in Moorgate Street, Cheapside, and Trafalgar Square, and has been in successful operation upon Waterloo Bridge since Oct. 7, 1871.

T. A. SKELTON, 37, Essex St., Strand, LONDON, INVENTOR AND PATENTEE.

GAS AND WATER PIPES.

WILLIAM MACLEOD & CO.,

18 & 20, ALSTON STREET, GLASGOW.

CAST-IRON GAS AND WATER PIPES.

DELIVERY F.O.B. ON CLYDE.

Prices on application.

MOBBERLEY & PERRY,
THE HURST
FIRE CLAY and BRICK WORKS,
STOURBRIDGE.

Proprietors of
BEST GLASS-HOUSE POT and CRUCIBLE CLAY.
Manufacturers for Home and Export.
GAS-RETORTS, GLASS-HOUSE FURNACE,
BLAST-FURNACE, & TANK BRICKS, LUMPS, TILES,
And Every Description of Best Fire-Bricks.

C. & W. WALKER,
MIDLAND IRON-WORKS,
DONNINGTON, NEAR NEWPORT, SHROPSHIRE,
MANUFACTURERS OF
TELESCOPIC AND SINGLE-LIFT
GASHOLDERS,
CAST & WROUGHT IRON GASHOLDER-TANKS,
CONDENSERS, SCRUBBERS, & PURIFIERS.
LONDON: 8, FINSBURY CIRCUS, E.C.

THOMAS READ & CO.,
BRAZILIAN IRON-WORKS,
MALTON, YORKS,
MANUFACTURERS OF
GAS and WATER PIPES,
Bends, Tees, and Irregulars,
AND
GENERAL FOUNDERS.

ESTIMATES and PRICES on APPLICATION.

G. J. EVESON,
GAS COAL MERCHANT,
STOURBRIDGE.
Delivery per Rail to any Part.

THE WIGAN COAL AND IRON COMPANY,
LIMITED,
COLLIERY PROPRIETORS,
(HEAD OFFICES: WIGAN, LANCASHIRE;
DISTRICT OFFICE:
18, BENNETT'S HILL, NEW STREET, BIRMINGHAM,)
Supply the Best Wigan Arley Mine Gas Coal & Nuts,
THE BEST HAND-PICKED ROUND CANNEL,
ALSO SMALL OR GAS CANNEL, &c., &c.

GEORGE ORME & CO.,
GAS METER MANUFACTURERS, BRASSFOUNDERS & FINISHERS,
ATLAS METER-WORKS, OLDHAM.

CONSUMERS WET & DRY GAS-METERS ON THE MOST APPROVED PRINCIPLES.
STATION-METERS, GOVERNORS, PRESSURE-REGISTERS,
And every Description of Gas Apparatus.
GAS, STEAM, AND WATER FITTINGS.

Established

1795.

JOSEPH CLIFF & SON,
THE ORIGINAL
WORTLEY FIRE-BRICK WORKS,
NEAR LEEDS,
MANUFACTURERS OF ALL DESCRIPTIONS OF
FIRE GOODS, and Salt-Glazed Drain-Pipes.
LONDON WHARF:
Wharf No. 4, inside Great Northern Goods Station, King's Cross, N.;
LIVERPOOL—1, Back Leeds Street,
Where is always kept a Stock of Retorts, Fire-Bricks, Terra Cotta Ware, and Drain-Pipes.

MESSRS. NEWTON, CHAMBERS, & CO.,
THORNCLIFFE IRON-WORKS AND COLLIERIES,
NEAR SHEFFIELD,
STRONGLY RECOMMEND A TRIAL OF THEIR
CELEBRATED SILKSTONE GAS NUTS.

Analysis by F. J. EVANS, Esq., Chartered Gas Company, Horseferry Road, Westminster:—

(COPY.)

	Cubic Feet of Gas per Ton of Coal.	Illuminating Power in Candles.	Coke per Ton of Coal used.	Ash in Coke, per Cent.	Sulphur in Coal, per Cent.
Silkstone Nuts . . .	10·800	15·85	12·66 cwt.....	6·9	0·69

NOTE.—The illuminating power of the gas was tested by the standard burner now used in London by the Gas Referees, under the City of London Gas Act, 1868.

Horseferry Road, Westminster, March, 1870. (Signed) F. J. EVANS.

These Nuts are extensively used by various Gas Companies throughout the Kingdom, who bear strong testimony to their value.

APPLICATIONS FOR PRICES, &c., TO BE SENT DIRECT TO THE COLLIERY, AS ABOVE.

ROBERT MARSHALL,
CANNEL COAL MERCHANT,
173, ST. VINCENT STREET, GLASGOW.

RUSSEL'S BOGHEAD.

MUIRKIRK, No. 1, CANNEL
Yields 12,160 cubic feet of 32·5-candle gas per ton, and 10 cwts. of excellent coke, containing only 5 per cent. of ash.

MUIRKIRK, No. 2, CANNEL
Yields 10,700 cubic feet of 32·77-candle gas per ton, and 9½ cwts. of coke, containing 11 per cent. of ash.

OLD WEMYSS CANNEL
Yields 13,320 cubic feet of 32·5-candle gas per ton.
Prices and full Analyses on application.

GAS COAL
Of every description delivered f.o.b. United Kingdom, or cost freight and insurance Abroad, upon lowest terms.
Contracts undertaken for the Shipment, Insurance, and Delivery Abroad of Plant and Materials for Gas and Water Works, &c.
THOMAS BROCKELBANK & CO.,
Coal Exporters and Ship and Insurance Brokers,
115, LEADENHALL ST., LONDON.

POPE & PEARSON'S GAS COAL.—We have now the authority of several of the most eminent Gas Engineers of London in stating that our Coal yields *in practical working over* 10,000 *cubic feet of gas, with an illuminating power of* 16 *candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.
One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.
For further particulars, apply to POPE AND PEARSON, West Riding and Silkstone Collieries, near LEEDS.

THE EARL OF HUME'S
LESMAHAGOW
MAIN SEAM CANNEL COAL.
CRAIGNETHAN GAS COAL CO.,
LESMAHAGOW, N.B.
Analysis and Price on Application.

SCOTTISH CANNEL COAL.
J. & W. ROMANS,
GAS ENGINEERS AND COAL FACTORS,
CONTRACT FOR SUPPLYING ANY QUANTITY
OF
GAS, HOUSE, AND STEAM COAL,
AND
CANNEL;
Also for every sort of
GAS APPARATUS AND FIRE GOODS.
FOR PRICES, &C., APPLY TO THE OFFICES,
30, ST. ANDREW SQUARE, EDINBURGH.

THE
HUCKNALL COLLIERY COMPANY
Can offer a CANNEL COAL yielding a large quantity of Gas of superior quality.
Prices and information on application to the HUCKNALL COLLIERY COMPANY, Hucknall Torkard Collieries, near NOTTINGHAM.

SCOTCH GAS COALS.
ROBERT CRAWFORD & CO.,
GAS COAL MERCHANTS,
STIRLING, N.B.,
Supply or Contract for all the principal
SCOTCH CANNELS AND SPLINTS F.O.B. Scotland; or cost, freight, and insurance abroad.
Being Sole Agents for London and the Southern Counties, they can offer upon the very lowest terms.
English Coal also supplied.
Full Analysis and Prices on application.
LONDON ADDRESS:
3, COLVESTON CRESCENT, DALSTON, E.

WYLAM WOOD COAL COMPANY,
LIMITED,
WYLAM-ON-TYNE.
WYLAM WOOD CANNEL COAL WORKED FROM ABOVE COLLIERY.
Analysis—10,280 cubic feet of gas per ton of Coal, having an Illuminating Power of 26·2 Sperm Candles, and yields 13¾ cwt of Coke per ton of Coal.
PORTS OF SHIPMENT:
TYNE DOCK AND NORTH DOCK, SUNDERLAND.
For prices and further particulars, apply to
UTRICK ALEXANDER RITSON,
6, QUEEN STREET,
NEWCASTLE-ON-TYNE.

CANNEL COAL.
COPPA COLLIERY, MOLD,
Beg leave to call the attention of Gas Companies to the superior quality of their
CANNEL FOR GAS-MAKING PURPOSES.
This Cannel produces in actual working, in iron retorts, 9200 cubic feet of 32-candle gas, and upwards of 11 cwt. of coke, and in clay retorts will produce 11,500 cubic feet of 25·9-candle gas.
Ports of shipment—Birkenhead or Connah's Quay.
Waggons supplied for delivery by railway to any part of England or Wales.
For particulars, prices, and rates of freight, apply to The Coppa Colliery, Mold, FLINTSHIRE.

SCOTCH CANNEL COALS.
The Subscriber is prepared to contract for the supply of all the principal SCOTCH CANNEL COALS. Prices and Analyses of the various Coals will be forwarded on application.
JAMES M'KELVIE,
CANNEL COAL MERCHANT,
HAYMARKET, EDINBURGH.
Established 1840.

LEE and JERDEIN,
COAL OWNERS & MERCHANTS.
Chief Office:
9, LANCASTER PLACE, STRAND, LONDON, W.C.
SOLE VENDORS FOR
LONDON & THE SOUTHERN COUNTIES
OF
WIGAN COAL AND CANNEL,
From the Mines of the
INCE HALL COAL & CANNEL COMPANY, Limited,
AND
Messrs. W. H BRANCKER & Co.

THOMAS LAMBERT & SONS
MANUFACTURE EVERY DESCRIPTION OF
GAS AND WATER FITTINGS;
ALSO,
WROUGHT-IRON TUBES & FITTINGS.
SHORT STREET, LAMBETH, LONDON.

THE LOCHORE AND CAPLEDRAE CANNEL COAL COMPANY, LIMITED.

Works: LOCHORE by LOCHGELLY, FIFESHIRE. Office: 19, MAITLAND STREET, EDINBURGH.

This Company request attention to the very superior quality of their Cannel Coals.

1. The following are the practical results given by Dr. Wallace, of Glasgow, of analyses of their Lochore and Capledrae Cannels:—

	Sample worked at Capledrae.	Sample worked at Lochore.
Gas per ton of coal, at 60° Fahr. and 30 inches barometric pressure	13,095 cubic feet.	11,760 cubic feet.
Illuminating power, in standard sperm candles, by union jet consuming 5 cubic feet per hour, at ·5-inch pressure	32·91	34·83
Value of 1 cubic foot of gas in grains of sperm	780	836
Equivalent of a ton of coal in pounds of sperm candles	1,459	1,404
Durability of 1 cubic foot by 5-inch flame	69 minutes.	71 minutes.
Gravity of the gas (air = 1000)	596	594

Remarks.—This (the sample from Capledrae) is a Cannel Coal of first-class quality, giving 13,000 feet of 33-candle gas. It contains only a minute proportion of sulphur, and the ash is almost quite white. The coke is of rather inferior quality.

Remarks on Sample from Lochore.—This is a Cannel Coal of first-class quality, giving a large yield of very rich gas and a coke of medium quality.

2. The following are the practical results of analyses by Dr. Wallace of the Company's Waverley Cannels:—

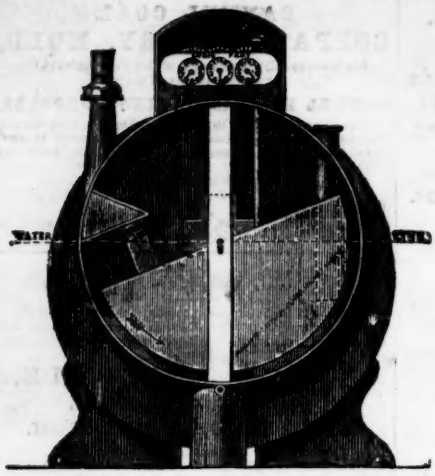
	Capledrae Waverley.	Lochore Waverley.
Gas per ton of coal, at 60° Fahr. and 30 inches barometer	9,120 cubic feet.	11,145 cubic feet.
Illuminating power, in standard candles, by union jet consuming 5 cubic feet per hour, at ·5-inch pressure	36·62	33·09
Value of 1 cubic foot of gas in grains of sperm	878	794
Equivalent of a ton of coal in pounds of sperm candles	1,145	1,264
Durability of 1 cubic foot of gas by 5-inch flame	80 minutes.	67 minutes.
Gravity of the gas (air = 1000)	677	597

Remarks on the Sample of Capledrae Waverley.—This Coal gives fully 9000 feet of gas of 36½ candles, and is admirably adapted for bringing up the quality of gas made from common coal or inferior qualities of cannel. The tests were made at a rather high temperature, this being one of the coals that stand a very high heat without serious diminution of the illuminating power of the gas The coke contains 60 per cent. of ash, and is therefore almost valueless, but the proportion of sulphur is very moderate.

Remarks on the Lochore Waverley.—This is a first-class Cannel Coal, giving 11,000 cubic feet of 33-candle gas. The quantity of sulphur is very minute, and the ash is nearly white. The coke is of inferior quality, but not wholly valueless.

Applications for full Copies of Analyses and Prices may be made to the Company, at

19, MAITLAND STREET, EDINBURGH.



THE

UNVARYING WATER-LINE GAS-METER.

(SANDERS AND DONOVAN'S PATENT.)

"Unquestionably the best Water Gas-Meter now in use."—Thos. G. Barlow, C.E.

Over 90,000 in action.

MANUFACTURERS

THE GAS-METER COMPANY,

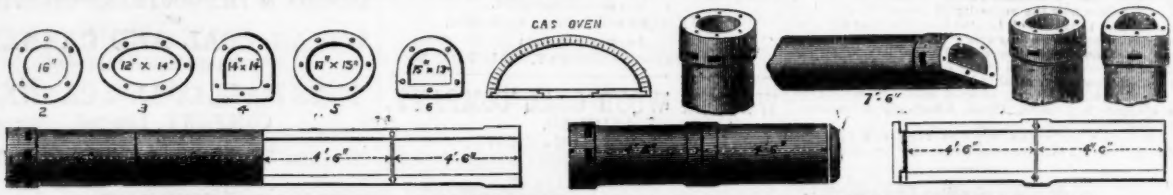
KINGSLAND ROAD, LONDON;

WITH

Branch Manufactories at DUBLIN and OLDHAM.

HARRIS & PEARSON,

FIRE-CLAY AND BRICK WORKS, STOURBRIDGE.

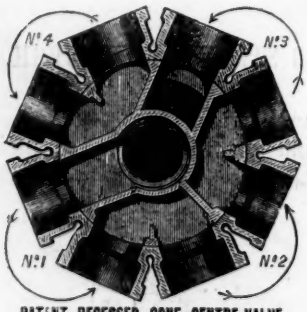


GAS-RETORTS, LUMPS, TILES, & FIRE-BRICKS,

OF EVERY DESCRIPTION.

A LARGE ASSORTMENT OF GAS-RETORTS IN STOCK.

STOCK FOR EXPORT READY AT THE WORKS, AND AT ELLESMERE PORT.



PATENT RECESSED CONE CENTRE-VALVE.
Sectional Plan.

R. LAIDLAW AND SON,

EDINBURGH AND GLASGOW,

SOLE MAKERS OF

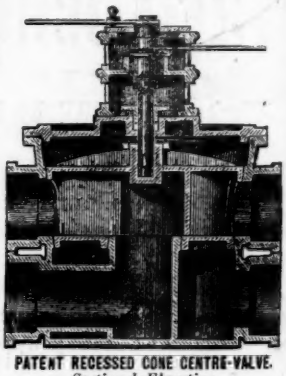
PATENT

RECESSED CONE CENTRE-VALVES,

Constructed on the principle of the ordinary Plug-Cock.

THROUGH-WAY & FOUR-WAY COCKS

Of all descriptions.



PATENT RECESSED CONE CENTRE-VALVE.
Sectional Elevation.

LONDON OFFICE: 106, CANNON STREET.

D. HULETT and CO., 55 and 56, HIGH HOLBORN, LONDON,

PATENTEES and MANUFACTURERS of the ONLY GOOD MERCURIAL GAS REGULATOR

Invite the attention of Gas Companies and the Trade generally to their Improved GAS-METERS, which they warrant equal to any in Quality, Workmanship, and Simplicity of Construction, and the only Meters from which Gas cannot be obtained without being duly registered.

MANUFACTURERS OF

GAS CHANDELIERS, GLASS LUSTRES, HALL LANTERNS, VESTIBULES, BRACKETS, PENDANTS;

DOUBLE CONE, ALBERT, SHADOWLESS, & EVERY DESCRIPTION OF BURNER, UNION JETS, BATSWINGS, ETC.;

IMPROVED FULL-WAY CARTER'S VALVES (much approved of);

GAS-STOVES, and every article connected with Gas Apparatus.

CAST & WROUGHT IRON PIPE, BLACK & GALVANIZED. COPPER, TIN, BRASS, & COMPOSITION TUBING.

D. HULETT'S IMPROVED SERVICE CLEANSER

for clearing out Mains, Services, and Interior Fittings—65s. net.

Boyle's Patent Silvered Glass Combination Reflectors and Outside Lanterns.

Sole Manufacturers of Church and Mann's Photometer.

Large Pattern-Books, with every description of Gas-Fittings, Chandeliers, &c., with complete Book of Prices, 12s.

London: Printed by William Boughton King (at the office of Clayton and Co., 17, Bouverie Street, Fleet Street); and published by him at No. 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, February 16, 1875.